Energy, Mines and
Resources Canada

Énergie, Mines et
Ressources Canada

ENERGY OVERVIEW STUDY OF REMOTE COMMUNITIES IN CANADA

Canada

ENERGY OVERVIEW OF CANADA'S REMOTE COMMUNITIES

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ABBREVIATIONS AND DEFINITIONS

EMR - Energy Mines and Resources Canada

kWh - Kilowatt hour

kWh/l - Kilowatt hours per litre (of oil)

GJ - Gigajoule

M - Million

PJ - Petajoule (1,000,000 GJ)

cord - 8' x 4' x 4' of stacked, cut roundwood

/ - the / symbol is used to indicate either one number divided by another or as a connection between two words. The exact meaning is determined by the context, e.g. firewood costs $80/cord in some communities and/or it is cut for free by individuals. Efficiency is determined by the energy output/fuel used.

Conversion Factors

(all based on total energy content of the fuel before combustion)

1 GJ = 25.8 L of fuel oil
1 GJ = 36.8 L of propane
1 GJ = 1/16 cord wood
1 L oil = .0387 GJ
1 L propane = .0272 GJ
1 cord wood = 16 GJ

NOTE: For the purpose of determining oil equivalence, electricity (including hydro power) is assumed to be generated from oil at a rate of 3.0 kWh/1 l, unless an actual conversion is given.

ENERGY OVERVIEW OF CANADA'S REMOTE COMMUNITIES

EXECUTIVE SUMMARY

Canada's remote communities are distinct from Canada's urban communities and diverse amongst themselves. Besides the obvious differences of geography and climate, the communities include lifestyles ranging from primitive to modern and economies ranging from traditional subsistence to industrial. The consequent use of energy is influenced by the climate, lifestyle and economy of the community while its cost is a function of geography and the efficiency by which the energy is transported and sold. This Energy Overview of Canada's Remote Communities was prepared to assist Energy Mines and Resources Canada to catalogue and analyse the remote community energy data available from existing sources and indicate the potential for reducing energy consumption and in particular reduce the need for petroleum products.

The incentive in saving energy is an economic one from both local and national perspectives. The high degree days of heating required in many remote communities coupled with the high transport cost of energy combine to give costs of energy far in excess of the rest of the country. Costs are potentially so high that severe economic constraints could result because energy expenses (where the consumer pays the cost of energy) can become the largest household expense in a low income family. Consumer energy costs are relieved in many communities, because of local energy availability (hydro and wood), and subsidies. The consumers themselves adapt to high energy costs by space heating smaller homes to a lower comfort level and by curtailing, either voluntarily or by regulation, the use of electricity. The Overview provides listings and summaries of several key energy categories to assist with the understanding of community energy uses and costs.

Methods to assist with the goals of energy conservation and reduction of petroleum uses are available to many communities. Conservation can be achieved through upgraded building insulation, waste heat recovery and energy management. Fuel substitution can occur with the use of small hydro, wood, wind and solar as the principal locally available energy sources. Connections could be made to central electricity and natural gas systems in some instances and there are a number of developing technologies. Many remote communities already make use of some of these options, but there could be more widespread use and a consequent reduction in energy needs. The study estimates that the use of energy could be reduced by 25% to 26.7 PJ/year and the use of oil reduced by 38% to 13.2 PJ/year if the communities improved their energy related infrastructure and developed the feasible local sources of energy. The resulting cost of oil saved would be $80M/year based on the average cost and savings potential. These figures are felt to be conservative, because many of the energy conservation possibilities were only taken to cover part of the community. Improved data on community infrastructure can be used with the database package to update estimates in future years.

The rate of conversion to improved energy systems in remote communities has been relatively slow, and a number of technical, economic and institutional barriers have been identified which are hindering the process. Technical barriers include the requirement for proof of technical feasibility and the

development of a successful maintenance program, including management and technical skills within the community. Economic barriers include the requirement for proof of economic feasibility and a requirement to finance the high capital costs of many conservation and alternative energy systems. An understanding of the annual costs of improvements to the energy system relative to existing energy costs must be developed. The institutional barriers include the policies of the many agencies, both government and commercial, which are involved in the supply and use of energy in remote communities. These policies, and the physical infrastructure which has been built because of them, serve to limit some of the technical options available, and introduce economic constraints imposed by the agencies' views of the energy scene affecting their own interests. Reference to the community energy tables and charts indicates that in communities which have a low level of economic activity, government and commercial energy use often exceeds residential use, with the average ratio of residential energy to total community energy use for all remote communities being about 30%. Therefore overcoming the related barriers will lead to a significant improvement in community energy use.

The Energy Overview of Canada's Remote Communities has catalogued all of the available community energy information in a consistent format. Through the use of a database management program, the information has been summarized in one page reports, while key numerical data has been tabulated for the various regions. A spreadsheet program has been used to provide more detailed numerical analysis and graphs of key energy categories provide a rapid visual analysis of community energy in each region. The database is readily changed when information is available. Further improvements in remote community energy use will be possible once more information about community infrastructure and resources is known, once technical developments are proven and once economic evaluations in all situations are performed consistently. The result will be an understanding of the energy options available to communities and the resulting benefits which will accrue on the local, regional and national levels.

ÉTUDE GÉNÉRALE DES QUESTIONS ÉNERGÉTIQUES DANS LES COLLECTIVITÉS ÉLOIGNÉES DU CANADA

Résumé

Non seulement les collectivités éloignées du Canada se distinguent-elles des centres urbains du pays, elles diffèrent aussi entre elles. Outre les différences géographiques et climatiques évidentes, ces agglomérations ont des modes de vie passant du primitif au contemporain et des économies allant du mode de subsistance traditionnel à l'économie industrielle. La consommation d'énergie y est donc influencée par le climat, le mode de vie et l'économie tandis que le coût de cette énergie dépendra de la géographie et de l'efficacité avec laquelle elle est transportée et vendue.

L'étude que voici a donc été préparée pour aider Énergie, Mines et Ressources Canada à répertorier et à analyser les données sur l'énergie dans les collectivités éloignées obtenues de sources existantes et à relever les possibilités de réduire leur consommation, particulièrement de produits pétroliers.

L'intérêt qu'ont ces agglomérations à économiser l'énergie est avant tout économique, tant du point de vue régional que du point de vue national. L'ampleur de degrés-jours de chauffage requis dans nombre de ces endroits, conjuguée à des frais élevés de transport de l'énergie, s'allient pour porter le coût de l'énergie bien en sus de ce que paient les autres régions du pays. En effet, le coût peut grimper jusqu'à devenir prohibitif, étant donné qu'il absorbe (lorsque le consommateur l'assume) la plus grande partie du budget d'une famille à faible revenu. Il est donc allégé dans bien des collectivités au moyen de subsides et de l'utilisation des ressources locales (hydro et bois). Les consommateurs eux-mêmes réagissent à la facture élevée de l'énergie en chauffant des maisons plus petites à un degré moindre de confort et en réduisant, soit par choix soit en raison d'un règlement, la consommation d'électricité. L'étude comprend des listes et des résumés de plusieurs catégories clés d'énergie afin de nous faire mieux comprendre les habitudes et les coûts énergétiques des collectivités.

Les méthodes qui peuvent aider à atteindre les objectifs en matière d'économies d'énergie et de remplacement du pétrole sont à la portée de bien des collectivités. Ainsi, elles peuvent ménager en améliorant l'isolation thermique des immeubles, en récupérant la chaleur résiduelle et en gérant l'énergie. L'utilisation de petites centrales hydro-électriques, de l'énergie du vent, de l'eau, du soleil ou du bois peut aussi servir à remplacer du combustible, lorsqu'elle est réalisable dans la région. La collectivité peut être parfois raccordée aux réseaux centraux de gaz et d'électricité, et il existe un certain nombre de nouvelles techniques prometteuses. Nombre de ces collectivités éloignées ont déjà recours à certaines de ces options. Leur utilisation cependant pourrait être plus répandue, ce qui réduirait les besoins. Ainsi, on

estime que la quantité d'énergie utilisée pourrait baisser d'un quart pour atteindre 26,7 PJ par année, celle du pétrole diminuant de 38 % pour être de 13,2 PJ par année, si les collectivités amélioraient l'infrastructure liée à l'énergie et exploitaient les sources locales d'énergie. L'économie de pétrole qui en résulterait pourrait atteindre 80 millions de dollars par année si l'on se fie au coût moyen et au potentiel d'économie. Nous croyons que ces estimations sont prudentes, parce que de nombreuses possibilités d'économie d'énergie n'ont été appliquées qu'à une partie de l'agglomération. De meilleures données sur l'infrastructure de chaque agglomération peuvent servir, avec la base de données, à réviser les estimations au cours des prochaines années.

Le rythme de conversion des installations énergétiques dans ces collectivités est relativement lent; de plus, certains obstacles d'ordre technique, économique et collectif qui nuisent au processus ont été identifiés. Parmi les problèmes techniques, on note la nécessité d'établir la faisabilité technique et d'élaborer un programme réalisable d'entretien, y compris de créer des capacités gestionnelles et techniques au sein même de la collectivité. Les barrières économique comprennent la nécessité de démontrer la faisabilité économique et de financer le coût en capital fort élevé de nombreuses installations d'économie d'énergie et d'utilisation des énergies de remplacement. Il faudra d'abord connaître le coût annuel des améliorations à apporter aux installations par rapport au coût actuel de l'énergie. Enfin, les entraves collectives ont trait entre autres aux politiques de nombreux organismes, tant gouvernementaux que commerciaux, qui sont engagés dans la distribution et l'utilisation d'énergie dans les collectivités éloignées. Ces politiques, de même que l'infrastructure matérielle mise ne place pour y répondre, limitent en partie certaines des options techniques réalisables et introduisent des contraintes économiques découlant de la façon dont l'organisme voit la scène énergétique influer sur ses intérêts. D'après les tableaux concernant la consommation énergétique de toutes ces collectivités, dans celles qui ont un faible niveau d'activité économique, l'utilisation d'énergie par le gouvernement et par les commerces excède souvent celle du secteur résidentiel, le rapport moyen de la consommation du secteur résidentiel étant environ 30 % de la consommation totale de la collectivité. Surmonter les barrières économiques devrait donc beaucoup améliorer l'utilisation qui est faite de l'énergie au sein de la collectivité.

On trouvera dans l'étude un répertoire de toute l'information connue sur l'énergie dans les collectivités, présentée de manière cohérente. Grâce à un programme de gestion de la base de données, l'information a été résumée en rapports d'une page, tandis que les données numériques clés sont regroupées sous forme de tableaux pour les diverses régions. Un programme de feuilles de travail a été utilisé pour permettre une analyse numérique plus complète, et un simple coup d'oeil sur les graphiques des principales catégories d'énergie donne une idée de l'énergie utilisée dans chaque région. La base de données se met facilement à jour lorsque parvient une nouvelle information. Des améliorations supplémentaires aux données sur l'utilisation de l'énergie dans les collectivités éloignées pourront être faites lorsque nous aurons plus d'information sur l'infrastructure et les ressources des collectivités, que les développements technologiques auront fait leurs preuves et que les évaluations économiques auront été exécutées de manière uniforme pour toutes les situations. Nous comprendrons alors mieux toutes les options énergétiques dont disposent les collectivités et les avantages qu'elles donneraient à l'échelle locale, régionale et nationale.

Cette étude a été effectuée par Sigma Engineering Ltd. dans le cadre du Programme de démonstration dans les collectivités éloignées d'Énergie, Mines et Ressources Canada.

1. INTRODUCTION

1.1 BACKGROUND

The Remote Community Demonstration Program (RCDP) was created in 1982 to encourage and assist remote communities in developing energy alternatives and conservation methods. By early 1984, overview studies containing community energy profiles had been completed, covering most regions and remote communities in Canada. The purpose of this report is to combine the information in the regional overview studies with complementary technology reports and site specific studies, to produce a self-contained national energy overview of remote communities. The terms of reference required the following information to be presented:

1. Summary of energy-related characteristics and trends including population, economic base, building quality, and energy alternatives.
2. Mapping of communities, electrical grids, gas pipelines.
3. Sample community verification and charting of basic energy data.
4. Analysis of energy consumption with respect to fuels and end uses, per capita demands and provincial summaries.
5. Analysis, aggregation and summary of energy supply and pricing together with indications of rates and subsidies.
6. Projection of energy use based on the status quo and based on energy system improvments.
7. Descriptive Summary of appropriate energy supply and conservation technologies.
8. Provision of a generic remote community energy database format for implementation and maintenance by Energy Mines and Resources Canada.
9. Descriptive summary of barriers to conservation and alternative energy supply.
10. Observations and conclusions.

The computer database specified in Item 8 above was used as the tool to assemble and store data extracted from the regional overviews. This basic data was used to derive total and per capita quantities, regional and national totals and averages, and energy use projections.

1.2 REMOTE COMMUNITIES IN CANADA

Remote communities are closely tied with the history of Canada and have played a key part in the economic development of the country from the exploration and fur trade era to recent resource developments. Many of today's remote communities began as self-sufficient outposts depending on locally available resources for their existence. Today all remote communities share varying degrees of reliance on oil products for electricity generation, space heating and transportation.

Remote communities fall into several categories, including native villages, resource towns (minerals, wood, fish) tourism, transportation hubs and commercial centres (serving dispersed populations). Energy costs to consumers are often higher than the rest of Canada despite subsidies from various provincial and federal agencies, and resource development companies. The harsh climates found in most remote communities, combined with relatively low incomes (except for resource towns) and high energy prices makes the total cost of energy potentially a higher percentage of community income than in the rest of Canada. Many communities have only been able to adapt to the situation through curtailment of energy use, use of local "free" resources such as wood and/or a reduction in the standard of living.

This report summarizes the range of alternate energy supply technologies and energy conservation measures available and the barriers to their implementation. The data analysis indicates the magnitude of energy savings possible with the adoption of suitable conservation and energy supply measures in each community as well as providing a summary of existing energy uses.

2. OPPORTUNITIES FOR CONSERVATION AND ALTERNATIVE ENERGY SUPPLY

2.1 SUMMARY OF BACKGROUND KNOWLEDGE

The most comprehensive sources of data on remote communities are the regional overview studies which were completed between 1981 and 1984. All regions of the country were covered, with the exception of the Maritimes, which have no remote communities, and the Northwest Territories. The Northwest Territories communities are all defined as remote and the data originated from several studies covering specific sub-regions, specific technologies and general information.

The regional overviews contained both status quo information on energy use as well as descriptions about appropriate technologies and measures for saving energy and oil.

The quality of information on energy use and alternatives ranged from complete community profiles and detailed descriptions of alternatives, to profiles with large data gaps with inconsistent analysis of alternatives. The wide variations in data quality were handled in the following manner:

1. - where complete blocks of data are missing, there are no certain means of estimating it. However, reference to the energy use charts in Section 8.2 will indicate what the typical range of uses could be for communities of similar population and economic base.

2. - where opportunities in conservation and alternative energy were omitted in a regional overview they were incorporated into the community options based on descriptive information provided in the overview itself, or in overviews of adjoining regions.

3 - where energy prices are not specifically stated, they are estimated from communities with similar supply lines in the region.

4. - where housing quality is not stated, the houses are assumed to be in "fair" condition with moderate insulation levels, for the purpose of calculating potential savings with improved insulation.

5. - where diesel generator efficiency was not provided directly, or where either of the fuel use or kWh generated categories were not complete, the fuel efficiency was assumed to be 3.0 kWh/l, which is an average value.

6. - communities which had insufficient information to make reliable estimates were left with "zero" values, however the number of communities in this category was a small fraction of the total. When such information becomes available, the database can be easily updated.

For further information on assumptions used in calculation routines, refer to Appendix 1.

Table 2.1 following summarizes the range of conservation and alternative energy opportunities available in all regions with approximate price levels. The data originates from the community overview reports referenced in Section 7.

The following notes apply to Table 2.1:

1. The figures shown represent percentages of existing energy use which could be supplied by conservation and various alternatives.

2. If more than one alternative was applied the total savings may not be additive. Such analysis would occur with in depth study.

3. Not enough information is known about potential energy in peat, wood gas, wood or steam turbines, geothermal, biogas, coal, heat pumps, or natural gas to provide an estimated energy potential. As most of these alternatives could only apply to a relatively small number of communities, their contribution would be small.

4. In the case of small hydro, sometimes one community has excess potential which is limited to the community energy needs when added in to the regional potential total.

5. Regions in which wood is used extensively for space heat have low potential for increasing its use. Other regions may have low potential because of low wood resources or low suitability of wood for use in the community.

2.2 SUMMARY OF TECHNOLOGIES

The regional overview studies and other references written under the sponsorship of the Remote Community Demonstration Program have analysed a variety of conservation and alternative energy technologies which may be suitable for use by remote communities. These techniques are listed in Tables 2.2 and 2.3, with a brief description of what is involved in implementation of each. Further references on the topics are listed by number and are found in Section 7.

REGION Savings potential as a percentage of total energy	CONSERVATION							ALTERNATIVES (Showing electrical or heat cost $/kwh)													
	Insulation	Waste Heat	Stoves (Airtight)	Management	Water Heat		Oil Heat * .05-.15	Hydro (Small) .10+	Hydro (Grid) .05+	Wood Heat .03	Peat ?	Wind .15-.30	Wood Gas .27	Wood or Steam Turbine .60	Solar ?	Geothermal ?	Biogas ?	Coal .09	Heat Pump ?	Natural Gas ?	AVG. OIL PRICE ¢/ℓ
NEWFOUNDLAND	12	14	4	10	U			4	13	4	U	9	U	U	U	U	U	U	U	U	35
QUEBEC	U	15	U	10	U			5	10	U	U	8	U	U	U	U	U	U	U	U	30-54
ONTARIO	21	7	12	10	U			21	0	2.5	U	2.5	U	U	U	U	U	U	U	U	25-99
MANITOBA	12	16	7	10	U			49	37	0	U	0	U	U	U	U	U	U	U	U	29-48
SASKATCHEWAN	16	11	6	10	U			15	0	5	U	0	U	U	U	U	U	U	U	U	25-40
ALBERTA	21	13	9	10	U			0	12	16	U	0	U	U	U	U	U	U	U	U	31-36
BRITISH COLUMBIA	5	11	2	10	U			30	5	5	U	1	U	U	U	U	U	U	U	U	30-66
YUKON	7	1	1	10	U			1	0	12	U	0	U	U	U	U	U	U	U	U	40-63
NORTHWEST TERRITORIES	5	7	0.5	10	U			2	6	2	U	1	U	U	U	U	U	U	U	U	40-76
CANADA	6	9	2	10	U			10	7	5	U	3	U	U	U	U	U	U	U	U	25-99

"U" Denotes unknown potential

* Oil heat is shown for cost comparison only

SUMMARY OF CONSERVATION AND ALTERNATIVE ENERGY OPPORTUNITIES

TABLE 2.1

TABLE 2.2

ENERGY CONSERVATION TECHNOLOGIES

Technique	Description of Technique and Knowledge Required for Implementation	Reference (Section 7)
Insulation	Estimation of optimal R value, construction techniques, use of air/vapour barriers, cost effective means of upgrading existing buildings to higher insulation ratings. Requires knowledge of existing building construction, climate, cost of heating, local construction skills and costs.	8, 26
Waste Heat	Recovery of jacket water heat and exhaust gas heat from diesel generators (to a lesser extent from wood gasifiers and turbines) and economically conveying the heat to a building or a group of buildings. Requires knowledge of generator size, cost of heating, proximity of generator to other buildings, requirement for heat, local construction skills and costs.	31, 38
Airtight Stoves	Conversion of existing inefficient wood heaters/stoves to modern, safer "airtight" wood stoves. Chimney conversions may also be required. Requires knowledge of existing stove types, existing use of wood, costs of wood, installed costs of new stoves, safety practices.	39
Energy Management	Utilization of existing energy resources more effectively by peak load shedding, thermostat setbacks, de-rating (decreasing wattage of) heaters and lights, and other low cost techniques for controlling energy. Requires knowledge of existing and projected energy uses and controls, costs of control systems.	30
Diesel Efficiency	Analysis of diesel generator fuel use relative to power produced to ensure that the size and operation of the generator is as efficient as possible. Also, that the electrical distribution system has low energy losses. Requires knowledge of existing generator size, power system details, production records.	40
Community Energy Planning	All encompassing study to ensure that each sector of the community is using the most cost effective source of energy for each end use. Requires knowledge of community setting, all uses of energy, costs of energy and feasibility of alternatives.	35

TABLE 2.3

ALTERNATIVE ENERGY SUPPLY TECHNOLOGIES

Technique	Description of Technique and Knowledge Required for Implementation	Reference (Section 7)
Small Hydro Power	Utilization of locally available water power potential for electrical generation. Requires knowledge of system load pattern, hydrology, site conditions, transmission line length and construction costs, costs of existing energy supplies.	6
Grid Connection	Extending an existing power supply and distribution system (assuming it does not use oil for generation) via a transmission line. Requires knowledge of existing electrical loads and potential for load growth with less expensive power, site conditions, distances, construction costs and cost of existing or alternative energy supplies.	9
Wood Heat	Utilization of locally available fuel wood resources for space heating. Requires knowledge of existing heat costs, forest resource base (sustained yield), cost of wood collection, cost of system conversions.	39
Peat	Use of locally available peat resources for space heat and possibly electrical generation. Requires knowledge of peat reserves, cost of drying, extraction and transportation, technology and cost of combustion system, comparative costs of existing systems.	18, 32
Tidal	Use of local tidal resources for power generation. Requires knowledge of load pattern, tidal pattern, site conditions, construction costs, costs of comparative systems.	3
Wind	Use of local sites with a favourable wind regime for the installation of one or more wind turbines for the displacement of diesel generated electricity. Requires knowledge of wind energy available, turbine system efficiency, diesel generation costs and load patterns, synchronizing techniques, maintenance estimates.	13, 15

TABLE 2.3 (Continued...)

Technique	Description of Technique and Knowledge Required for Implementation	Reference (Section 7)
Wood Gas	Use of prepared fuelwood stock to supply energy to a wood gasification system which uses wood gas to operate an engine generator, and utilizes the heat produced to sustain the process and as low grade space heat. Requires knowledge of fuelwood reserves and collection/preparation costs, system capital, operation and maintenance costs, power system loads and existing costs.	11, 14
Wood Steam Engine or Turbine	Uses steam produced in a wood fired boiler to power an engine or turbine. Requires knowledge of the locally available wood resource and costs of harvesting, preparation and operating, system costs, load patterns and existing system costs.	4
Solar	Uses sunlight to produce electricity through photovoltaic cells or to produce warm water for space and water heat. Also concerns building design and location to optimize passive solar energy. Requires knowledge of system costs, solar energy radiation pattern and value of energy displaced from other sources.	
Geothermal	Utilizes local sources of geothermal heat for production of steam for electricity (usually obtained by drilling wells) or using warm water springs for space heat (wells are optional). Requires knowledge of the quantity of heat available, development costs, transportation of the energy (i.e. electricity transmission or hot water piping) the community energy requirements and the costs of alternative heat sources.	5
Coal	Utilizes local sources of coal for space heating (power generation is unlikely to be feasible on the relatively small scale requirements of remote communities). Requires knowledge of coal reserves, delivered costs, combustion system installation and maintenance systems and air pollution effects.	19

TABLE 2.3 (Continued...)

Technique	Description of Technique and Knowledge Required for Implementation	Reference (Section 7)
Heat Pump	Involves the use of a compressor, similar to that used in a refrigerator, for extracting heat from the air or an aquifer containing water warmer than ambient temperature. Requires knowledge of seasonal air and water temperatures, electricity costs, costs of alternative heat sources.	36
Natural Gas	Involves the development of gas wells and the transportation of the fuel to remote communities via pipeline or in a compressed form for cartage by land, water or air. Requires knowledge of gas reserves, well development costs, pipeline/transportation costs, and utilization costs as well as costs of existing systems.	21, 22, 37
NOTE:	All of the preceding techniques must be analysed in a consistent manner which accounts for their installation, operation and maintenance costs, and considers the effect of interest rates and inflation rates on the overall costs. The comparative costs with existing or alternative systems must also be evaluated in the same manner to determine the optional solution.	

2.3 SUMMARY OF BARRIERS TO IMPLEMENTATION OF CONSERVATION AND ALTERNATIVE ENERGY TECHNOLOGIES

The regional overview studies and other references noted in this report have all identified numerous barriers to the implementation of conservation and alternative energy technologies. These barriers apply to varying degrees in all regions and must be overcome before a significant improvement can occur in conserving energy and reducing oil consumption. The barriers are listed in terms of Technical, Economic and Institutional categories, and a brief explanation of each is provided in Table 2.4.

TABLE 2.4

BARRIERS TO IMPLEMENTATION OF CONSERVATION AND ALTERNATIVE ENERGY TECHNOLOGIES IN REMOTE COMMUNITIES

	Name	Description
Technical Barriers		
1.	Lack of Knowledge:	Communities, agencies and individuals must be aware of the cost and other implications (i.e. level of service and convenience, health and safety, environmental) of their existing systems, the means to make them more efficient and of the alternatives available. Refer to Table 2.2 and 2.3 for areas where knowledge may be required.
2.	Lack of Resource Data:	Systems using a local resource (wood, water, wind) must have information on the size, reliability of the resource and implications of resource use.
3.	Lack of Site Specific Data:	Existing infrastructure must be documented, (building conditions, generation systems) in order to plan improvements. The site plans pertaining to alternative systems must be provided to derive accurate cost estimates.
4.	Lack of Skill:	There must be personnel within a community capable of managing and operating an energy system and preferably personnel capable of installing the system.
5.	Lack of Infrastructure:	Some energy conservation systems require both a legal infrastructure (e.g. a village council) to implement and operate as well as a physical infrastructure (municipal services, equipment, skilled personnel) to be constructed and operated effectively. Effective delivery of construction and generating supplies must be assured. These infrastructures are not present in all communities.
6.	Lack of Technical Viability in Remote Locations:	The energy conservation and alternative energy systems must be proven to be reliable and provide a level of service comparable to existing systems. The reliability must be proven in locations of comparable climate and skill level.
7.	Lack of Information on Health and Safety:	Similar to Item 6, operating experience must document hazards associated with the energy systems, such as the need for ventilation in "air tight" buildings, electrical safety information, use of safe chimneys, etc.

TABLE 2.4 (Continued...)

Name	Description
Economic Barriers	
1. Lack of Proof of Cost Effectiveness:	Documentary evidence using energy systems in a variety of community situations must be provided based on actual results. Capital and operating costs must be presented consistently.
2. Lack of Incentive:	Communities, individuals, businesses and government agencies all view energy costs from a different perspective. Subsidies and other economic factors may shelter the true cost of energy and leave the energy consumers with limited incentive to conserve energy or improve the supply. Economic uncertainties may mean that the longer payback periods of some systems cannot be justified.
3. Lack of Capital:	Most energy improvement systems need capital funds to design and implement. There may be capital available in financial markets but individuals, businesses, and remote communities may find difficulty in qualifying for funding, or in meeting payment conditions.
Institutional Barriers	
1. Lack of Mandate:	Many institutions as well as individuals play a role in remote community energy supplies such as utilities, fuel dealers, businesses, government agencies and community agencies (schools, churches etc). They all use energy but energy optimization is not their primary goal, nor is there a body responsible for ensuring that all aspects of a community's energy use are optimized.
2. Lack of Cooperation:	The institutions listed above are not obligated to cooperate with one another until there is coordination of their efforts, nor is there always an incentive to cooperate when they may only see a portion of the community energy bills.
3. Lack of Accountability:	Agencies and institutions, with the exception of utilities are usually present in remote communities for a purpose other than energy supply and optimization. Hence the energy they use is like a business expense and they would seldom be evaluated on their energy efficiency, only on the delivery of their stated service.

3. ENERGY SUPPLY AND PRICING

3.1 MODES OF ENERGY SUPPLY AND BASE PRICES

Energy prices in remote communities are made of several inputs. Fuel prices are made up of the blended wellhead oil price, which is consistent throughout Canada, plus varying levels of provincial tax, refinery costs, transportation costs and dealer mark-up. The retail price of oil in the community is then affected by the quantity purchased, the size of storage facilities and the effect of any subsidy which may be applied.

Electricity prices are further complicated by differing subsidies, operating costs, and power sources ranging from hydro electric to diesel. The differences result in widely varying rate schedules for customer categories and amounts used. These prices and the fuel supply line system are summarized in Table 3.1

3.2 DERIVATION OF ACTUAL ENERGY COSTS

Energy costs are composed of the actual bulk fuel costs in the community plus the costs of operating the energy delivery system which converts fuel to energy. The difference between these costs and the selling price is a measure of the subsidy or profit. A summary of fuel prices found in communities, costs of delivered energy and levels of subsidy is provided in this section.

Oil Prices

Oil prices are detailed in the community data sheets in Appendix 4 and are summarized by region in Table 3.1. These prices are generally the reported bulk prices in the community for diesel or heating oil. Consumers buying small quantities would expect to pay more and miscellaneous fuels, such as gasoline, kerosene and naptha would also cost more.

Electricity Prices

Most community generators use oil purchased at bulk rates. In nearly all remote communities, electricity users pay a subsidized rate. The actual cost of producing electricity depends on fuel price and generator efficiency, and can be estimated using Figure 3.1. The costs of system operation and maintenance often exceed the fuel cost, but these are not included as they would be present for any source of supply. The prices paid by the consumers are shown on the individual community data sheets (Appendix 4) and the ranges for residential customers are shown in Table 3.1. Many utilities charge a rate approaching the generation cost for commerical accounts or for excess residential use. Some utilities also impose load restrictions to discourage the use of electricity for space and water heating.

Remote communities which are not served by recognised utilities also pay a variety of electricity prices and they may also have load restrictions. Rates range from free power (in some company towns), up to nominal flat rates and unlimited use, utility rates, and full cost of generation and distribution.

TABLE 3.1

ENERGY SUPPLY AND PRICING

Region	Community Type or Location	Mode of Fuel Transport	Delivered Oil Cost ($/litre)	Elec. Price to Consumer ¢/kW.h	Year
Newfoundland	Labrador Coast	Ship	.31 - .46	4.3 - 7.9	82
	Island	Ship	.29 - .43	4.3 - 7.9	82
Quebec	Nouveau Quebec	Ship/Barge	.48 - .54	2.4 - 15.0	82
	Central Quebec	Road/Rail	.23 - .83	1.2 - 33	82
	Lower North Shore	Ship	.32 - .34	2.7 - 3.4	82
	Magdalen Islands	Ship	.23 - .31	2.7 - 3.4	82
Ontario	James Bay	Barge/Winter Road	.43 - .93	9.4 - 13.0	81/85
	Native Interior	Air/Winter Road/Road	.22 - .99	9.4 - 13.0	81/85
	Railway	Rail/Road	.24 - .48	9.4 - 13.0	81/85
Manitoba	Rail or Road	Rail/Winter Road	0.29 - .41	5.0 - 2.53*	82
	Air Access	Air	0.44 - 0.60	5.0 - 2.53*	82
Saskatchewan	All	Road/Barge/ Winter Road/Air	.25 - .39	3.5 - 16.5	82
				3.5 - 16.5	82
Alberta	All	Road/Barge	.33 - .35	10. - 13.	83
B.C.	Coastal	Tanker/Barge	0.30 - 0.38	5 - 10	82
	Road Access	Road	0.30 - 0.38	5 - 10	82
	Air Access	Air	0.68	N/A	82
Yukon	All but one	Road	0.40 - 0.55	5 - 54	83
	Old Crow	Air	.63	N/A	83
NWT	Arctic Coastal	Ship/Barge/Air	.47 - .76	15 - 35	84
	Mackenzie Valley	Road/Barge/Air	.39 - .75	5 - 28	84

*Marginal rate declines above 250 kWh/month for residential customers with limited service. Commercial and institutional accounts pay closer to the full cost of providing diesel generated power ($0.22 - $1.30 /kWh).

Wood Fuel Prices

Prices reported for firewood ranged from zero to over $100/cord. Assuming one to two days labour per cord at $5/hr plus $10 to $15 per cord for expenses, results in a cost of $50 to $95 per cord. Where no wood cost is reported, a figure of $70/cord may be used for the purpose of economic analysis.

The graphs in Figure 3.2 may be used to estimate cost per gigajoule of various fuels including wood. Graph 1 shows that for a wood stove with 50% efficiency using wood at $80/cord, the energy cost is about $10.00 per GJ. Graph 2 shows that 25¢/l oil burned at 65% efficiency also results in an energy cost of $10.00 per GJ. Graphs 3 and 4 show comparative costs with propane and electricity.

3.2.1 Fuel Price Subsidies

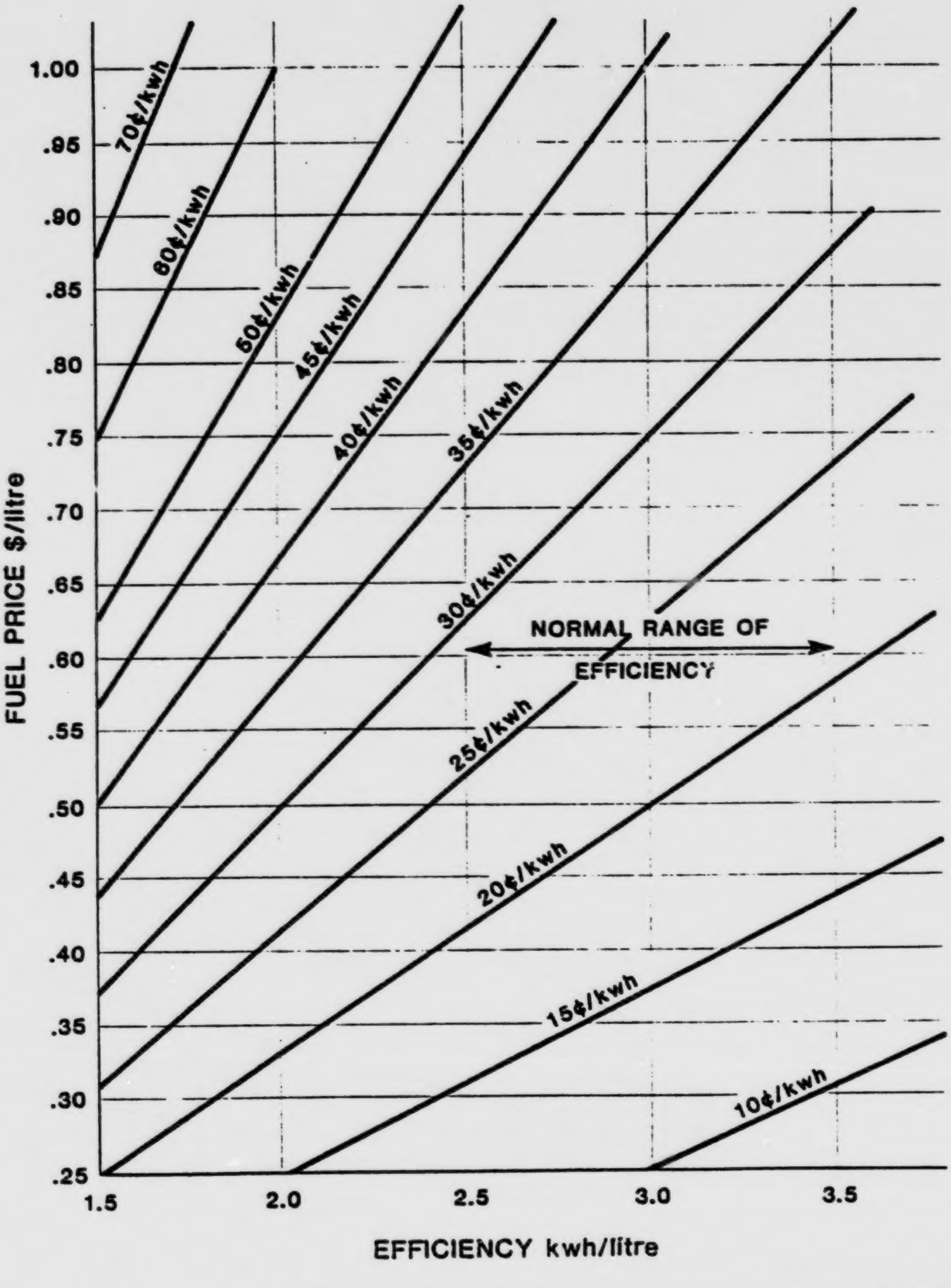
A determination of the amount of subsidy applicable to each community is a difficult task for the following reasons:

- Uncertainty of direct subsidies in base fuel price, transportation cost and selling price.
- Uncertainty in the true cost of supplying and delivering electricity compared with the revenue.
- Rate schedule variations between different categories of electrical customers.
- Energy and accommodation included as part of employee benefits.

For example, in some company towns, fuel and electricity are supplied to residents at or below cost. Low fuel tax rates in certain provinces may also be considered a form of subsidy. In some native villages on the prairies, seniors may buy firewood at $35/cord. Electrical rate structures where commercial accounts pay a higher cost help to subsidize residential accounts. Other examples include:

- The Canada Mortgage and Housing Corporation (CMHC) has a rural and remote housing program which applies to qualifying houses built off Indian reserves. Fuel prices for these residences are subsidized to the level of grid-connected towns in the region.
- Government agencies sometimes fully or partially subsidize energy costs to employees.
- In northern Quebec residential power bills are paid by the regional government.

The effect of a subsidy is beneficial from the perspective of the power consumer, but from the viewpoint of energy conservation a subsidy reduces the "incentive barrier" described in Section 2.3. Using Figures 3.1 and 3.2, together with specific community data, can help to indicate the magnitude of direct subsidies.



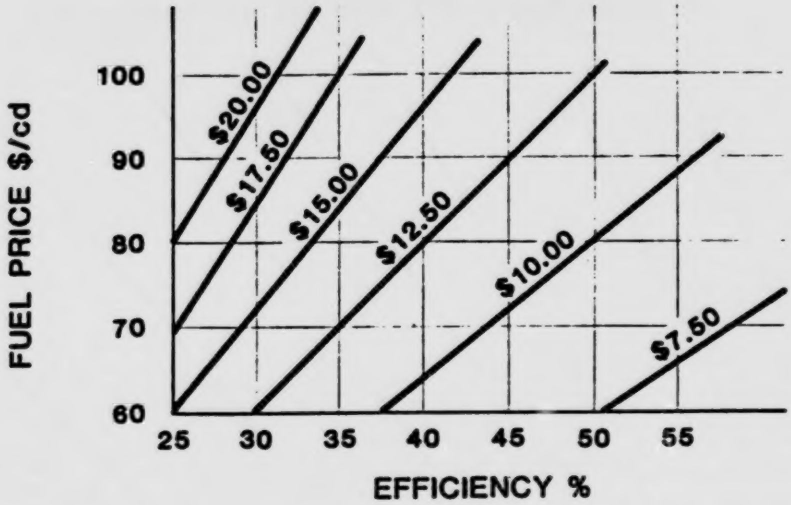
COST PER KILOWATT HOUR
(Includes maintenance at 20% of fuel cost)
Not including distribution system maintenance

DIESEL FUEL ELECTRICAL GENERATION COSTS
FIGURE 3.1

3409
JMG MAR 1983

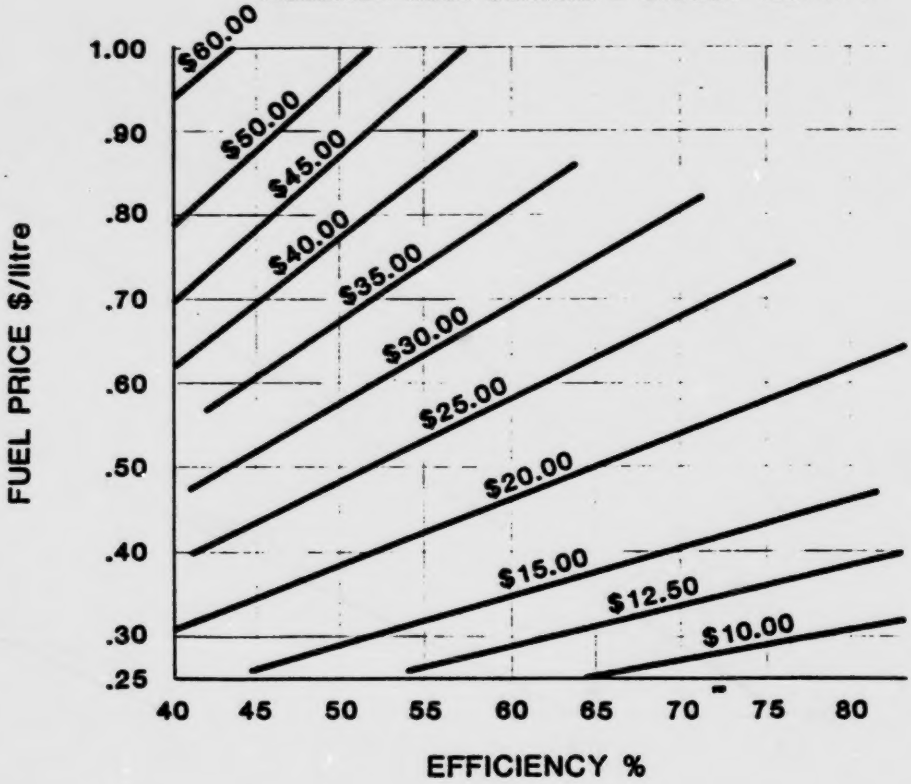
WOOD HEAT
Cost per net GJ
Assumed heat content 16 GJ/cd

1.



OIL HEAT
Cost per net GJ
Assumed heat content = 0.0387 GJ/litre

2.

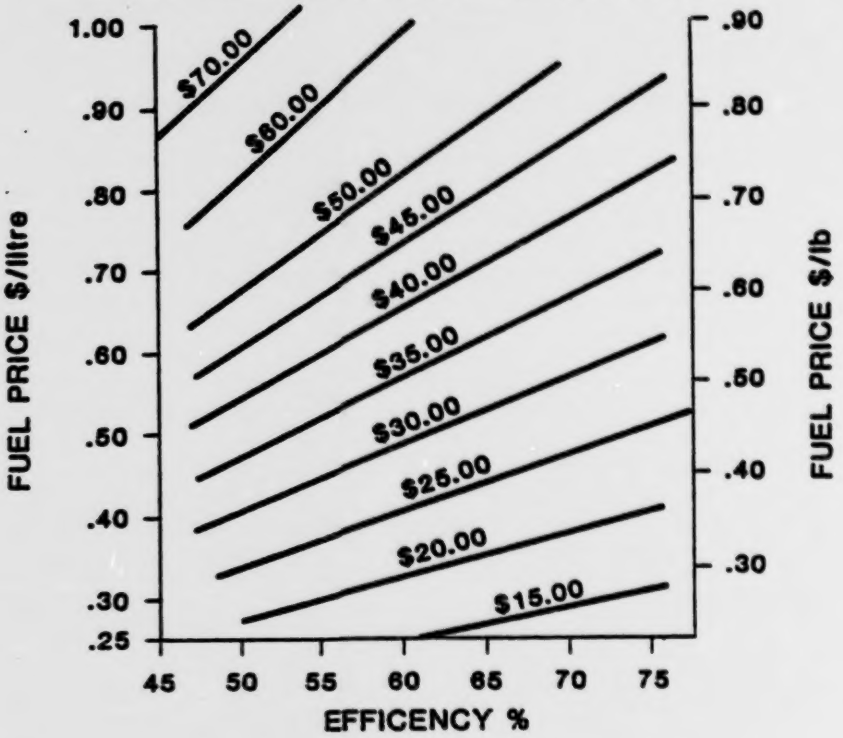


SPACE HEATING COSTS
FIGURE 3.2 PART 1

9409
JNB MAR 1983

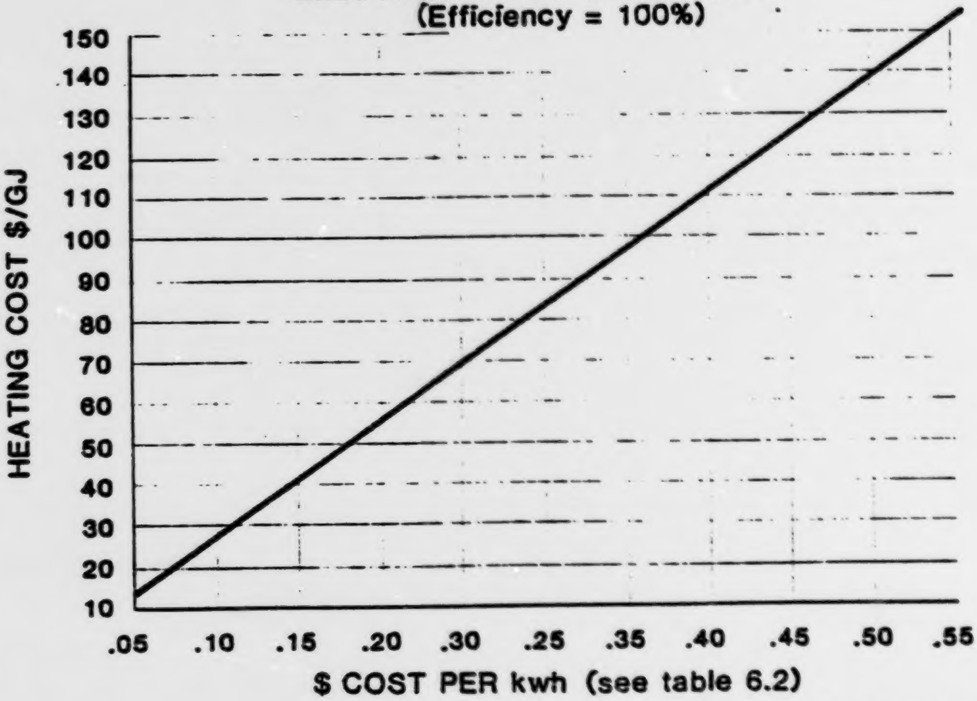
3.

PROPANE HEAT
Cost per net GJ
Assumed heat content = 0.0272 GJ/litre



4.

ELECTRICITY FOR SPACE HEAT
(Efficiency = 100%)



SPACE HEATING COSTS

FIGURE 3.2 PART 2

3409
MAR 1983

4. METHODOLOGY

4.1 DATA ASSEMBLY, AGGREGATION AND MANIPULATION

A database was designed to contain all the information required to meet the terms of reference of the study. Data from the regional overviews was transferred to the national database, but some significant gaps remain due to varying levels of detail found in the regional studies. One of the advantages of a computer database is that missing information can fairly easily be added as it becomes available and information from the sources can be presented in a consistent format.

A further complication arises because the data from different regions was originally collected at different times as summarized in Table 4.1.

The database contains many derived quantities which are calculated by inserting basic data into formulae. One level of aggregation involves simply adding category entries to produce summaries or averages. The next level involves combining categories, as shown in the following formulae:

Diesel Efficiency = (total annual electricity, kW.h)/(fuel per year, L)

Average electrical power = (total annual electricity, kW.h)/(8760 hours/year)

Total Renewable Energy = (Wood energy) + (Hydro energy) + (Wind energy) + (Solar energy) + others, if applicable

Total Non-Renewable Energy = (Oil for electricity) + (Oil for space heat) + (Propane) + others, if used

Electricity Demand per Capita = (Total Electricity)/(population)

Electricity Demand per House = (Total Residential Electricity)/(Number of homes)

Total Cost of Oil Consumed = (Diesel price x Diesel used for electricity generation) + (Heating oil price x Total Heating Oil Consumption)

Per Capital Oil Consumption = (Total Non-Renewable Energy)/(Population)

The most complicated analysis involves calculations of projected consumption and potential energy from conservation and alternative energy systems. These calculations are performed outside the database in a spreadsheet program then loaded back into the database as described in Appendix 1.

TABLE 4.1

SUMMARY OF SOURCE DATA DATES

Region	Data Type	Year in Which Data Originates
Newfoundland	Demographics Energy	1981 1982
Quebec	Energy and Demographics	Oct 81 - Oct 82
Ontario	Demographics Energy	1982 1981
Manitoba	Energy and Demographics	1982
Saskatchewan	Energy and Demographics	1981 - 82
Alberta	Energy and Demographics	1982
British Columbia	Energy Demographics	Apr 1981 - April 1982 1981 (Census)
Yukon	Energy and Demographics	1981 - 83
Northwest Territories	Energy Demographics Supplementary Data	Composite 1979 1981 (Census) Up to 1984
Canada	Energy : Statistics Canada Energy Summaries for all Provinces and Territories	1982

5. RESULTS OF DATABASE ANALYSIS

5.1 SUMMARIES OF BASELINE DATA: Energy and Electricity Summary

The summaries of baseline energy and electrical data include the aggregations of all the supplied and derived community data which were in several categories, namely total energy, residential energy, per capita energy use, per household electrical use and per capita electrical use. Note that electricity use is converted to an energy use as oil, using either the generator efficiency or an efficiency of 3.0 kWh/litre where no information exists.

An examination of this data indicates that a great range of absolute and per capita values exists. While it is not relevant to compare total energy uses, because of the wide range in population and industrial base, it is significant to discuss per capita uses as shown in the following Table 5.1.1. The regional averages range from 60.7 GJ per capita to 93.7 GJ per capita in the prairies, Ontario and Newfoundland, while the average jumps to 165.5 to 308 GJ per capita in the remaining provinces. All of the regions at the high end have significant industrial communities, especially mines and in the case of British Columbia, forestry camps and mines.

The summaries for all communities are grouped by region in tables at the end of this section. The regional totals are summarized in Table 5.1.2 for energy, electricity and oil. The information in Table 5.1.2 requires commentary in a few areas, namely:

- The residential energy/total energy in Newfoundland is high because nonresidential space heat was not available.
- Per household electrical use (only residential electricity) has not been calculated for Quebec because of missing information (i.e. number of houses missing in the Magdalen Islands and Lower North Shore. Residential electricity not shown for Central and Nouveau Quebec). In Ontario, residential electricity information was not available.
- Per capita electricity use (Total Electricity/person) is high in Quebec because of few load restrictions and some electric space heat. It is high in the Yukon because of the use of hydropower and mines. It is low in Ontario because of low industrial activity, and several areas are without power.
- Per Capita oil consumption is high in B C because of the industrial base and a significant proportion of oil space heat. It is high in the NWT because of the high space heat component. (Note the ratio of "oil for space heat: oil for electricity" in other regions).
- The two right side columns "Total Canada" represent the comparable energy total for all communities in each region. The Yukon and Northwest Territories were only available as a combined total, and transportation was not included. The relationship between remote and nonremote communities should only be used for rough comparisons, as the data were obtained by different means.

The data summary tables for Energy and Electricity which follow Table 5.1.2 are based on the community data presented in Appendix 4. The data is organised as follows:

Community Name: Communities are grouped according to identifiable regions within the regional overview and listed alphabetically. Identifiable subregions occur in the Yukon (3) Northwest Territories (5) Ontario (3) Quebec (4) and Newfoundland (4). In the remaining provinces the data would not be enhanced by subregional grouping.

Total Energy: Includes all reported energy in electricity and space heat, residential through industrial applications. To facilitate comparisons, electricity is converted to Gigajoules of oil equivalent before generation. Where hydro power is used, the conversion to oil is made at the rate of 3.0 kW.h/litre.

Residential Energy Use: Includes just the electricity and space heat used by residences (single family, multi unit, apartment).

Per Capita Energy Use: Total Energy/Population

Per Household Electricity Use: Residential Electricity/Number of Residences

Per Capita Electricity Use: Total Electricity/Population

Data Anomalies: Where zero values appear, the community either has no data in a category or no power generation.

Where "E7" notation appears, move the decimal one place to the right and read "millions". Where E8 appears, move the decimal two places to the right, and read "millions". For example, .702868 E7 means 7,028,680 or about 7.03 million.

Sums are provided for Total Energy and Residential Energy.

Averages are provided for Per Capita Energy, Per Household Electricity Use and Per Capita Electricity Use. The averages are based on adding the category totals such as Total Energy, Total Residential Electricity, Total Electricity then dividing through by the total population or number of residences as required to obtain the average. Zero values are carried through to the total, but the communities with zero values represent only a small part of the total population.

TABLE 5.1.1

PER CAPITA ENERGY USE IN REMOTE COMMUNITIES (GJ)

Region	Median Use	Low	Avg	High
Newfoundland	67.2	38.6	76.3	247.1
Quebec	97.1	25.3	165.5	1603
Ontario	63.2	26.5	69.3	206.7
Manitoba	68.3	40.3	93.1	277.5
Saskatchewan	71.0	47	77.6	191
Alberta	68.4	33.8	60.7	82.4
B C	199.0	7.6	261.5	20879
Yukon	202	86	308.0	1295
N W T	104	35.5	232.7	1890

NOTES:

1. Some communities have a 0.0 energy value because of a complete lack of information and are not included with the low values.

2. Low values are found in communities for which partial information is available, such as Peace Point AB, Earls Creek BC and Rae Lakes NWT. Low values at communities used seasonally include, Long Dog Lake ON and Tagish YT. Other low values occur at communities which receive energy from other communities, such as Hay Cove, Nfld and Black Lake, Sask.

3. High values are found at industrial communities in which a mine or other prime industry is dominant, such as Elsa YT, Western Mines BC, Asbestos Hill PQ, and Norman Wells NWT. Community energy uses are minor compared to industrial process energy. Some regions do not have any large industrial communities and their high energy use communities are not as easily explained. Examples include Paradise River Nfld, which has an inefficient generator and a high space heat load, and Stony Lake Sask, which has a high load in the community building sector.

4. Other irregularities can be explained by data problems. These can be determined by referring to the detailed data sheets in Appendix 4, noting the categories for which information was not available. When available the data can be included and the whole database relatively easily updated.

TABLE 5.1.2. - ENERGY USE SUMMARY

EXISTING (REMOTE COMMUNITIES)

	Pop'n	Total Energy PJ	Residential Energy PJ	Per Capita Energy GJ	Per Household Elec Use GJ	Per Capita Elec Use GJ	Oil for Electricity PJ	Oil for Space Heat PJ	Per Capita Oil GJ	Cost of Oil $ Millions	Total Canada	
											Total Energy PJ (Stats Can '82)	Total Oil PJ
Newfoundland	30,109	2.3	1.8	76	90	37	0.95	0.83	59	15.6	73.9	46.6
Quebec	38,330	6.3	1.12	165	115	122	2.7	1.67	114	38.7	883.8	367.7
Ontario	14,158	0.98	0.50	69.3	N/A	19.2	0.20	0.20	28.6	4.4	1481.1	285.0
Manitoba	12,313	1.15	0.55	93	129	43	0.54	0.25	64	7.2	151.8	39.7
Saskatchewan	3,452	0.27	0.12	77.6	77.7	29.2	0.08	0.08	48.8	1.44	197.2	65.5
Alberta	3,772	0.22	0.15	60.6	69.9	21.1	0.085	0.043	34.1	1.16	610.4	123.6
B.C.	25,252	6.6	1.83	261	102	107	2.12	2.19	171	41.4	428.9	121.1
Yukon	22,828	7.03	2.46	307	161	194	0.28	2.16	107	26.7	*	*
NWT	46,041	10.71	2.87	233	126	118	2.19	4.67	149	76.87	18.6	15.3
Total or Average for Remote Communities	196,255	35.6	11.4	181			9.15	12.09	108	214.5	4,068	1117

*YUKON COMBINED WITH NWT

GJ = GIGAJOULES

PJ = PETAJOULES (MILLION GJ)

TABLE 5.1.3 - Energy and Electricity Summary for Newfoundland

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Black Tickle	21078.0	14938.0	108.649	143.333	62.6804
Cartwright	56383.0	48741.0	85.6884	86.3636	33.2705
Charlottetown	16849.0	15648.0	67.3960	111.531	26.6640
Davis Inlet	15692.0	14701.0	65.3833	118.667	26.3792
Hopedale	29872.0	23229.0	70.2871	78.8941	31.4094
L'Anse au Loup	47378.0	39589.0	80.4380	90.0385	33.0968
-Capstan Island	0.00000	0.00000	0.00000	0.00000	0.00000
-English Point	0.00000	0.00000	0.00000	0.00000	0.00000
-Forteau	42119.0	39543.0	80.7981	96.3077	29.0308
-Fox Cove	0.00000	0.00000	0.00000	0.00000	0.00000
-L'Anse Amour	0.00000	0.00000	0.00000	0.00000	0.00000
-L'Anse au Clair	22911.0	19354.0	85.8090	105.954	39.1181
-L'Anse au Diable	0.00000	0.00000	0.00000	0.00000	0.00000
-Pinware	9835.00	9050.00	48.9303	80.1429	17.9603
-Red Bay	26332.0	23329.0	83.3924	68.6118	28.0222
-West St. Modeste	22084.0	20593.0	80.9938	142.240	31.5125
Makkovik	34028.0	25132.0	98.0634	141.457	56.2104
Mary's Harbour	32475.0	28970.0	79.5956	118.988	33.3795
-Lodge Bay	6865.00	6847.00	55.3629	45.0323	11.4032
Mud Lake	6484.00	6116.00	90.0556	199.733	46.7222
Nain	67855.0	57720.0	72.3401	96.5318	30.7882
Paradise River	22734.0	22587.0	247.109	173.803	39.3804
Port Hope Simpson	34192.0	32670.0	58.8503	96.1132	20.8176
Postville	22671.0	18464.0	101.664	159.940	54.7265
Rigolet	25190.0	21552.0	92.9520	121.892	42.6605
St. Lewis	21646.0	19155.0	77.3071	140.545	36.5036
William's Harbour	8451.00	7345.00	108.346	212.533	55.0513
Croque	9205.00	8661.00	62.6190	157.500	31.5578
Harbour Deep	23009.0	21718.0	82.7662	134.486	38.5072
Main Brook	34382.0	32106.0	66.8911	96.8400	27.9786
Roddickton	77816.0	69451.0	68.1401	82.1192	26.0210
-Bide Arm	20592.0	17632.0	60.7434	89.1333	24.5074
-Conche	30038.0	28594.0	64.7371	55.6545	16.3060
-Englee	68991.0	56832.0	69.1293	66.8766	27.9309
Saint Anthony	396724.	185533.	127.687	83.1862	86.2208
-Boat Harbour	9474.00	9336.00	44.9005	44.6170	10.5924
-Cape Onion - Ship Cove	13354.0	13096.0	47.9636	64.0000	14.6892
-Cook's Harbour	35683.0	26790.0	91.9665	119.979	50.7500
-Goose Cove East	19964.0	15389.0	54.2500	84.3385	27.3288
-Great Brehat	0.00000	0.00000	0.00000	0.00000	0.00000
-Hay Cove et al	16382.0	15598.0	38.6368	21.1348	6.28538
-Raleigh	19526.0	18656.0	52.3485	79.0000	19.2708
-St. Anthony Bight	19291.0	19210.0	90.1449	149.933	31.9065
-St. Carrol's	0.00000	0.00000	0.00000	0.00000	0.00000
-St. Lunaire - Grandois	58504.0	55054.0	57.9248	108.067	25.8851
-Wild Bight	0.00000	0.00000	0.00000	0.00000	0.00000
St. Julian's - Grandois	7487.00	6967.00	55.4593	114.750	24.2519
Change Islands	48473.0	38935.0	83.5741	78.4970	38.7759
Fogo	80495.0	64151.0	72.8462	76.6151	33.1647
-Deep Bay	8645.00	8360.00	56.8750	58.4000	15.3224
-Island Harbour	15723.0	14189.0	55.9537	79.3939	24.1068
-Joe Batt's Arm et al	77606.0	74721.0	67.1913	74.9254	21.6346
-Seldom	39026.0	31151.0	69.6893	96.6000	36.4875
-Stag Harbour	19898.0	19615.0	64.1871	57.1182	21.1806
-Tilting	28020.0	26762.0	65.6206	59.8545	18.3653

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Little Bay Islands	36015.0	30579.0	88.4889	82.7652	36.7420
St. Brendan's	25983.0	24592.0	55.5192	93.8762	24.0342
-Dock Cove	0.00000	0.00000	0.00000	0.00000	0.00000
-Hayward's Cove	0.00000	0.00000	0.00000	0.00000	0.00000
-Shalloway Cove	0.00000	0.00000	0.00000	0.00000	0.00000
Westport	27565.0	25785.0	59.0257	197.291	27.0471
-Purbeck's Cove	3941.00	3892.00	64.6066	83.8000	21.4098
Burgeo	209902.	138147.	83.8267	92.6271	50.4812
Francois	17112.0	15561.0	78.1370	131.091	40.0046
Grand Bruit	7175.00	6413.00	87.6875	150.652	52.8375
Grey River	14172.0	13537.0	60.5641	85.3333	24.5940
La Poile	11496.0	10765.0	61.8064	73.3585	24.8333
McCallum	13388.0	12421.0	55.0946	108.060	26.2140
Monkstown	9242.00	8630.00	82.5179	157.310	46.1964
Petites	8811.00	8129.00	81.5833	130.667	42.6111
Petit Forte	8116.00	7128.00	90.1778	169.522	54.3000
Ramea	109179.	72415.0	78.7727	85.5091	46.8846
Rencontre East	15077.0	14138.0	65.5522	116.709	31.9913
South East Bight	7726.00	7487.00	67.1826	109.267	30.5826
Sum or Average	.229635E7	.179340E7	76.2690	90.1718	37.0314

TABLE 5.1.4 - Energy and Electricity Summary for Quebec

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Akulivik (Cape Smith)	23400.0	0.00000	97.0954	0.00000	34.4398
Asbestos Hill	320500.	0.00000	1602.50	0.00000	1150.00
Aupaluk	11430.0	0.00000	112.059	0.00000	53.9216
Inukjuak (Port Harrison)	78700.0	0.00000	121.077	0.00000	45.6923
Ivujivik (C. Wolstenholme)	20600.0	0.00000	111.957	0.00000	44.0217
Kangiksuk (Payne Bay)	28600.0	0.00000	102.509	0.00000	46.5950
Kangiqsualujjuaq(George R)	30900.0	0.00000	92.7928	0.00000	40.8408
Kangiqsujuaq (Maricourt)	33800.0	0.00000	121.147	0.00000	46.5950
Killinik	0.00000	0.00000	0.00000	0.00000	0.00000
Kuujjuak (Fort Chimo)	169700.	0.00000	158.895	0.00000	68.3521
Kuujjuaraapik (P. Baleine)	175500.	0.00000	154.899	0.00000	53.3981
Povungnituk	77900.0	0.00000	103.590	0.00000	34.8404
Quaqtaq	22600.0	0.00000	138.650	0.00000	62.5767
Salluit	46700.0	0.00000	90.1544	0.00000	30.3089
Tasiujak (Leaf Bay)	12860.0	0.00000	121.321	0.00000	51.8868
Uumaruk	0.00000	0.00000	0.00000	0.00000	0.00000
Belleterre	12200.0	12200.0	25.9574	0.00000	0.00000
Clova	14990.0	3724.00	74.9500	74.4800	46.8500
Eastmain	26800.0	0.00000	81.4590	0.00000	60.1824
Fort Rupert	67000.0	0.00000	70.8245	0.00000	36.7865
Gagnon	.214700E7	0.00000	613.429	0.00000	571.429
Kawawchikamach	0.00000	0.00000	0.00000	0.00000	0.00000
Lac Rapide	21316.0	0.00000	63.2522	0.00000	46.0030
Obedjiwan	27900.0	0.00000	25.2947	0.00000	14.7779
Parent	72100.0	32000.0	90.1250	160.000	60.8750
Schefferville	0.00000	0.00000	0.00000	0.00000	0.00000
Selbaie	494550.	0.00000	494.550	0.00000	407.300
Wemindji	54600.0	0.00000	81.0089	0.00000	41.3947
Weymontachie	23420.0	0.00000	38.2055	0.00000	23.9804
Anticosti	103600.	0.00000	462.500	0.00000	190.179
La Romaine	58400.0	28700.0	114.286	225.984	81.2133
La Tabatiere	49500.0	23700.0	94.1065	180.916	69.3916
-Aylmer Sound	4157.00	3830.00	37.7909	141.852	37.7909
-Chevery	20500.0	12500.0	89.9123	219.298	89.9123
-Harrington Harbour	39800.0	11110.0	127.974	144.286	64.9518
-Mutton Bay	14800.0	10952.0	56.9231	168.492	56.9231
-Tete a la Baleine	33790.0	22040.0	75.7623	198.559	65.0224
Lourdes de Blanc Sablon	94480.0	44800.0	151.168	287.179	119.648
-Blanc Sablon	109000.	18360.0	301.939	204.000	74.7922
-Bradore Bay	10660.0	7780.00	86.6667	259.333	86.6667
-Middle Bay	6560.00	4592.00	45.8741	131.200	45.8741
-Old Fort Bay	14900.0	13100.0	47.7564	167.949	47.7564
-St. Paul's River	29800.0	23500.0	60.2020	191.057	60.2020
St. Augustin	69600.0	41600.0	65.7224	157.576	53.8244
Cap-aux-Meules	207000.	112000.	153.333	332.344	117.778
-Etang du Nord	373000.	193000.	138.046	285.926	100.666
-Fatima	350000.	161000.	112.576	207.207	73.0138
-Grand Entree	105100.	48000.0	107.354	196.721	69.5608
-Grosse Ile	50000.0	24000.0	95.6023	184.615	65.0096
-Havre aux Maison	261000.	121000.	104.400	193.600	68.0000
-Havre Aubert	305000.	137000.	102.555	184.388	64.8958
Iles d'Entree	17700.0	10170.0	114.935	267.632	80.5195
Sum or Average	.634341E7	.112066E7	165.495	115.681	121.892

TABLE 5.1.5 -
Energy and Electricity
Summary for Ontario

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Attawapiskat	58760.0	29338.0	70.9662	0.00000	20.6630
Fort Albany	63225.0	23851.0	141.443	0.00000	64.4139
Fort Severn	29627.0	20430.0	93.1667	0.00000	17.5000
Kashechewan	36783.0	23270.0	46.0940	0.00000	0.00000
Winisk	18408.0	7948.00	79.3448	0.00000	45.0862
Allan Water	3456.00	2007.00	69.1200	0.00000	14.3000
Armstrong	106086.	8910.00	132.608	0.00000	48.9000
Auden	9020.00	4201.00	106.118	0.00000	50.5529
Biscotasing	5549.00	2031.00	41.1037	0.00000	25.1926
Collins	6913.00	4315.00	69.1300	0.00000	14.7000
Ferland	5004.00	3580.00	61.7778	0.00000	14.1111
Graham	7753.00	2148.00	86.1445	0.00000	51.3333
Hillsport	9549.00	2327.00	140.426	0.00000	66.4853
Moose River Crossing	9010.00	7604.00	100.111	0.00000	0.00000
Oba	15505.0	3832.00	206.733	0.00000	95.6133
Ramsey	25014.0	8737.00	196.961	0.00000	125.402
Sultan	21686.0	10640.0	121.151	0.00000	44.9944
Angling Lake(Wapekaka)	10130.5	7418.60	49.1772	0.00000	6.75728
Bearskin Lake	19678.0	11456.0	58.5655	0.00000	8.65179
Big Trout Lake	63052.0	37923.0	84.0693	0.00000	24.7760
Cat Lake	17678.0	10382.0	56.1206	0.00000	10.5873
Deer Lake	23127.0	14678.0	48.0811	0.00000	6.70686
Fort Hope	31770.0	20602.0	45.0638	0.00000	8.31631
Gull Bay	17303.0	9845.00	60.5000	0.00000	20.0524
Kasabonika	19100.0	12790.0	43.0180	0.00000	7.46847
Kingfisher	14724.0	9938.00	58.1976	0.00000	10.4466
Lac Seul	21734.0	18795.0	40.4730	0.00000	2.86220
Lansdowne House	19248.0	7876.00	92.0957	0.00000	34.3445
Long Dog Lake	927.000	927.000	26.4857	0.00000	0.00000
MacDowell	2089.00	1611.00	80.3462	0.00000	18.3846
Muskrat Dam	9639.00	6086.00	55.7168	0.00000	12.0289
North Spirit Lake	13789.0	8413.00	48.8972	0.00000	10.3936
Ogoki/Marten Falls	9477.00	3759.00	63.1800	0.00000	6.09333
Pikangikum	48878.0	32220.0	51.6681	0.00000	10.2410
Ponask	2733.00	1432.00	88.1613	0.00000	22.8710
Poplar Hill	10161.0	6444.00	59.4211	0.00000	13.4795
Sachigo	14768.0	9487.00	43.5634	0.00000	7.53392
Sandy Lake	80887.0	42602.0	60.1838	0.00000	16.9613
Slate Falls/Fry Lake	5464.00	4385.00	66.6342	0.00000	12.4268
Summer Beaver	13311.0	9433.00	53.2440	0.00000	14.6520
Weagamow(Caribou Lake)	35266.0	17542.0	66.4143	0.00000	15.9529
Webequie	26711.0	15036.0	58.7055	0.00000	10.4615
Wunnummin Lake	18172.0	13624.0	57.1447	0.00000	7.46541
Sum or Average	981165.	499874.	69.3011	0.00000	19.2798

TABLE 5.1.6 -

Energy and
Electricity
Summary for
Alberta

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Fort Chipewyan	114000.	75400.0	71.2500	76.1194	26.3125
Jean d'Or Prairie	30970.0	17980.0	47.6462	54.2857	15.8923
Fox Lake	38470.0	23670.0	51.2933	69.4595	17.1200
Trout Lake AB	16120.0	12790.0	79.4089	92.8571	27.8325
Peerless Lake	16810.0	11520.0	82.4020	61.1628	28.0392
Chipewyan Lake	10260.0	8390.00	68.4000	37.1429	16.8000
Peace Point	2200.00	1400.00	33.8462	0.00000	7.69231
Garden Creek	0.00000	0.00000	0.00000	0.00000	0.00000
Sum or Average	228830.	151150.	60.6654	69.8684	21.1188

Energy and Electricity Summary for: Saskatchewan

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Black Lake	34065.0	19427.0	47.3125	66.4796	17.3819
Brabant	9153.00	4779.00	70.9535	70.0385	33.2326
Camsell Portage	8608.00	3986.00	141.115	73.5000	76.5082
Deschambault	32915.0	14364.0	63.6654	63.5366	29.9168
Fond du Lac	57303.0	17312.0	106.117	74.7312	26.8185
Garson Lake	4905.00	2788.00	58.3929	0.00000	19.3452
Kinoosao	7874.00	4943.00	97.2099	112.000	45.4815
Southend	29593.0	13194.0	56.0473	93.7800	27.4205
Stony Rapids	47670.0	19508.0	191.446	165.469	56.5502
Wollaston	35908.0	18476.0	66.1289	73.1868	28.8674
Sum or Average	267994.	118777.	77.6344	77.6948	29.2471

Energy and Electricity Summary for Manitoba

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Brochet	44583.0	22846.0	69.6609	67.3043	22.6688
Garden Hill	134783.	83979.0	74.8795	76.3660	24.8472
God's Lake Narrows	82604.0	50432.0	66.0832	75.5133	20.9448
God's River	20713.0	13694.0	82.8520	87.1282	28.9240
Granville Lake	5681.00	2969.00	40.5786	78.8839	12.4500
Lac Brochet	15324.0	6735.00	40.3263	46.0952	13.7474
Oxford House	85348.0	56013.0	68.2784	58.9266	18.4216
Pikwitonei	21844.0	13415.0	107.606	89.0000	32.9655
Pukatawagan	48246.0	26807.0	43.8600	98.0820	17.2136
Red Sucker Lake	27844.0	17918.0	65.5153	77.2264	19.3341
St. Therese Point	92236.0	60846.0	63.6110	78.4241	19.8497
Shamattawa	35969.0	23264.0	52.8956	62.9209	14.3029
Tadoule Lake	14684.0	8792.00	68.2977	43.0000	17.3674
Thicket Portage	22103.0	11515.0	110.515	74.7353	33.2251
Waasagomach	50561.0	27883.0	69.2616	73.1011	23.9137
Churchill	444058.	123900.	277.536	329.318	192.361
Sum or Average	.114658E7	550898.	93.1195	129.549	43.0871

TABLE 5.1.7 -

Energy and Electricity Summary for B.C.

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
ACTEON SOUND	11740.0	2290.00	260.889	103.000	126.556
ANAHIM LAKE	85389.0	34775.0	229.540	137.529	78.4194
ATLIN	159529.	93038.0	335.851	58.0000	64.2632
BAKER MINE CAMP	183150.	2265.00	6105.00	102.955	2080.00
BAMFIELD	75825.0	23711.0	303.300	114.749	165.516
BARCLAY DIV. (KILDONAN)	11740.0	2290.00	260.889	103.000	126.556
BARR CREEK	197.000	0.00000	7.88000	0.00000	0.00000
BELLA BELLA	179653.	88648.0	127.053	160.140	68.2023
BELLA COOLA	337147.	204225.	110.649	162.692	46.9501
BIG BAR/JESMOND CREEK AREA	11327.0	5437.00	85.1654	0.00000	29.0301
BOB QUINN LAKE	24460.0	2741.00	1438.82	103.000	464.235
BOULDER BAY	6643.00	2106.00	147.622	0.00000	92.6889
CASSIAR	.185300E7	143726.	1001.88	115.829	301.059
CHRISTIAN VALLEY	3178.00	2578.00	138.174	0.00000	0.00000
CLEAGH CREEK	26625.0	1058.00	591.667	102.875	302.000
DEASE LAKE	112446.	41033.0	264.579	91.1333	85.1435
DOME CREEK / CRESCENT SPUR	36337.0	26852.0	76.4990	0.00000	0.00000
DRURY INLET	26629.0	1058.00	591.756	102.875	302.000
EARLS CREEK	190.000	0.00000	7.60000	0.00000	0.00000
EASTGATE	19636.0	11096.0	392.720	20.5882	58.5200
ERICKSON GOLD MINE VILLAGE	100358.	6602.00	771.985	128.700	741.000
FIELD	52392.0	35162.0	194.044	90.0901	65.0000
FORT BABINE IR #6	12985.0	10831.0	76.3824	0.00000	0.00000
FORT WARE	12210.0	10757.0	84.2069	0.00000	0.00000
GERMANSEN LANDING	1824.00	0.00000	23.6883	0.00000	0.00000
GILFORD ISLAND	2626.00	2395.00	39.1940	50.7692	10.9403
GOOD HOPE LAKE - HIGHWAYS	22335.0	3339.00	1861.25	128.727	672.750
GREENWOOD CAMP	6446.00	1260.00	100.719	103.000	88.0313
HARTLEY BAY	33227.0	17852.0	155.266	102.944	66.5140
HESQUIAHT	7663.00	5602.00	85.1445	57.9167	25.9889
HOLBERG	95215.0	20181.0	200.032	77.2160	86.8445
HOLBERG DND	77197.0	11840.0	118.765	0.00000	95.4600
HORNET	282.000	0.00000	9.40000	0.00000	0.00000
ISKUT/EDDONTENAJON	88055.0	29424.0	352.220	37.4875	49.9760
JUSKATLA	40388.0	5957.00	403.880	96.5313	182.120
KILBELLA BAY	12141.0	3917.00	199.033	102.933	80.8361
KINGCOME INLET	22310.0	8486.00	166.493	90.0833	48.2164
KINGCOME INLET (WHONNOCK)	27717.0	1068.00	615.933	103.000	315.444
KITKATLA	35369.0	26999.0	76.3909	102.958	29.1469
KLEMTU	65171.0	29474.0	208.214	180.175	75.8275
KNIGHT INLET	11740.0	2290.00	260.889	103.000	126.556
KYUQUOT	14423.0	12287.0	48.0767	0.00000	0.00000
LASQUETI ISLAND	17188.0	13813.0	37.6105	0.00000	0.00000
LONGWORTH	732.000	0.00000	13.8113	0.00000	0.00000
LOWER POST	3249.00	0.00000	26.4146	0.00000	0.00000
MACHMELL	11740.0	2290.00	260.889	103.000	126.556
MAHATTA RIVER	50424.0	9417.00	252.120	64.3396	91.2550
MANNING PROVINCIAL PARK	65554.0	19616.0	541.769	109.381	235.281
MASSET	514661.	265300.	162.098	110.398	74.9666
MCNAB CAMP	9167.00	872.000	381.958	103.000	190.125
MEZIADIN LAKE - HIGHWAYS	21744.0	3234.00	1279.06	90.1176	481.706
MOOYA BAY (NOOTKA)	11740.0	2290.00	260.889	103.000	126.556
MOSES INLET	4829.00	0.00000	68.9857	0.00000	62.9571

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
NARROWS INLET LOGGING DIV.	11279.0	2183.00	250.644	103.000	126.556
NAZKO INDIAN BAND	12362.0	10438.0	109.398	0.00000	0.00000
NEMAIAH VALLEY INDIAN BAND	10643.0	8591.00	60.8171	0.00000	0.00000
NICKNAQUEET	352.000	0.00000	8.80000	0.00000	0.00000
NITINAHT	10940.0	4838.00	135.062	51.5000	39.9630
NUCHATLAHT	1609.00	1500.00	40.2250	38.7143	7.52500
OWIKENO	8782.00	3483.00	195.156	90.0833	75.1556
PENNY	1070.00	0.00000	14.4595	0.00000	0.00000
PHILLIPS ARM	11740.0	2290.00	260.889	103.000	126.556
PITT LAKE	11740.0	2290.00	260.889	103.000	126.556
PORT DOUGLAS (HARRISON)	11793.0	2343.00	262.067	103.000	126.556
PORTAGE (NANCUT)	8262.00	7122.00	86.9684	0.00000	0.00000
PROPHET RIVER	9344.00	5204.00	119.795	51.4615	18.0000
QUATAM RIVER	11740.0	2290.00	260.889	103.000	126.556
SANDSPIT	407608.	226820.	135.869	148.326	74.6297
SAVARY ISLAND	252.000	0.00000	8.12903	0.00000	0.00000
SCOTT COVE	27234.0	1058.00	605.200	102.875	315.422
SCOTTY GOLD	939.000	0.00000	11.7375	0.00000	0.00000
SECHELL CREEK	11740.0	2290.00	260.889	103.000	126.556
SEWELL INLET	48608.0	8019.00	267.077	90.1000	114.857
SEYMOUR ARM	38132.0	31973.0	268.535	0.00000	0.00000
SEYMOUR INLET	27233.0	1058.00	605.178	102.875	315.422
SHEEMAHANT	10176.0	2804.00	216.511	103.000	82.9787
SHOTBOLT	352.000	0.00000	8.80000	0.00000	0.00000
SIMOON SOUND	253.000	0.00000	7.90625	0.00000	0.00000
STAVE LAKE	5013.00	1927.00	91.1455	102.917	51.2182
STEWART	305785.	137110.	210.017	178.084	114.334
TAKLA	17379.0	14925.0	83.5529	0.00000	3.93269
TATLA LAKE	27453.0	11347.0	741.973	227.150	350.784
TELEGRAPH CREEK	39418.0	18849.0	112.623	93.6379	34.4857
TIDE LAKE	1455.00	0.00000	11.6400	0.00000	0.00000
TIMFOR	11740.0	2290.00	260.889	103.000	126.556
TOAD RIVER AREA	9991.00	8202.00	124.888	0.00000	0.00000
TOM BROWN LAKE	11740.0	2290.00	260.889	103.000	126.556
TROUT LAKE BC	16120.0	4927.00	322.400	0.00000	113.000
VERNON	65948.0	17633.0	262.741	90.0946	113.430
WAKEMAN SOUND	12200.0	2395.00	271.111	103.000	126.556
WESTERN MINES (MYRA FALLS)	626370.	473.000	20879.0	0.00000	11920.2
WOSS	141673.	32803.0	258.527	102.952	124.688
Sum or Average	.660441E7	.183325E7	261.540	101.808	107.167

TABLE 5.1.8 -

Energy and Electricity Summary for Yukon

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Dawson City	237093.	108608.	263.437	102.564	100.317
Watson Lake	235880.	126230.	206.912	102.075	90.6579
Whitehorse	.332900E7	.161100E7	221.915	177.407	120.200
Faro	.208300E7	219280.	1225.29	254.717	1056.09
Mayo	100948.	54268.0	201.896	170.517	103.200
Elsa	518078.	42620.0	1295.19	257.843	945.982
Keno	11159.0	8339.00	123.989	50.2368	29.2111
Beaver Creek	30917.0	10689.0	343.522	109.738	149.300
Burwash Landing	11046.0	6513.00	157.800	87.6500	71.5429
Destruction Bay	30842.0	7565.00	385.525	89.4286	250.288
Carcross	39167.0	27584.0	145.063	74.4231	47.7778
Carmacks	58895.0	33466.0	173.221	95.5556	72.0941
Haines Junction	91513.0	42714.0	198.941	100.333	89.7174
Johnsons Crossing	3501.00	2234.00	350.100	134.333	177.300
Old Crow	30661.0	16271.0	127.754	33.9474	40.8958
Pelly Crossing	22330.0	11598.0	124.056	77.4000	56.2278
Ross River	58098.0	38107.0	178.763	84.1304	57.5508
Stewart Crossing	9205.00	2562.00	460.250	164.667	292.500
Swift River	9151.00	4164.00	261.457	210.308	132.029
Tagish & Marsh Lake	41276.0	37736.0	85.9917	32.2500	16.1250
Teslin	56527.0	30228.0	153.606	73.8435	58.4810
Upper Liard	20393.0	16863.0	156.869	48.4167	26.8154
Sum or Average	.702868E7	.245864E7	307.897	161.309	193.843

Energy and Electricity Summary for: NWT

Energy and Electricity Summary for NWT

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Arctic Bay	42724.0	26261.0	113.326	104.102	37.8912
Broughton Island	52826.0	29992.0	168.236	89.0769	37.3439
Cape Dorset	93000.0	42956.0	128.276	95.8284	38.7586
Clyde River	45807.0	24320.0	103.402	86.0494	32.9345
Frobisher Bay	413050.	189112.	168.317	97.1547	87.1638
Grise Fiord	21111.0	8905.00	222.221	135.870	78.9474
Hall Beach	37318.0	22324.0	94.2374	94.7342	28.7879
Igloolik	95214.0	48588.0	124.300	97.7987	33.2898
Lake Harbour	92204.0	15426.0	307.347	124.423	35.0000
Nanisivik	185626.	70981.0	637.890	77.4000	332.474
Pangnirtung	89494.0	41260.0	98.4533	89.8026	29.7589
Pond Inlet	91134.0	45559.0	139.776	123.837	42.1779
Resolute	116394.	27366.0	657.593	261.226	500.000
Sanikiluaq	32333.0	19467.0	96.8054	129.375	38.4820
Baker Lake	115292.	67089.0	113.365	141.278	43.3235

Community Name	Total Energy (GJ)	Residential Energy Use (GJ)	Per Capita Energy Use (GJ)	Per Household Elec. Use (GJ)	Per Capita Elec Use (GJ)
Chesterfield Inlet	41265.0	17517.0	146.851	121.279	40.6975
Coral Harbour	52354.0	31525.0	126.459	238.253	68.4710
Eskimo Point	101874.	57520.0	103.953	86.8687	30.4796
Rankin Inlet	180756.	85760.0	189.075	142.857	73.5862
Repulse Bay	41036.0	22540.0	125.110	169.811	46.5579
Whale Cove	28466.0	15071.0	140.227	126.421	46.4384
Bathurst Inlet	0.00000	0.00000	0.00000	0.00000	0.00000
Cambridge Bay	168359.	44421.0	194.860	112.211	60.4745
Coppermine	82392.0	40100.0	107.561	83.7701	36.1593
Gjoa Haven	51223.0	24396.0	103.901	82.5510	29.5456
Holman	27114.0	15994.0	80.6964	125.410	32.2143
Pelly Bay	34802.0	15599.0	123.851	101.569	36.0142
Spence Bay	68217.0	32490.0	145.143	101.827	43.1447
Aklavik	94556.0	44091.0	126.075	93.4096	40.9733
Arctic Red River	9678.00	5420.00	122.506	79.9429	52.5316
Colville Lake	3704.00	3456.00	50.7397	0.00000	0.00000
Fort Franklin	44311.0	24036.0	79.9839	77.5179	26.8087
Fort Good Hope	47968.0	25966.0	107.552	48.3206	33.1300
Fort McPherson	101259.	45633.0	129.653	69.9767	36.5186
Fort Norman	40542.0	23492.0	129.942	86.9300	45.4359
Inuvik	516916.	163145.	178.740	305.470	102.697
Norman Wells	682311.	24068.0	1890.06	98.1539	139.058
Paulatuk	15567.0	10795.0	93.7771	179.966	42.3313
Sachs Harbour	26614.0	12209.0	153.024	181.278	75.9941
Tuktoyaktuk	105717.	39121.0	141.522	94.1420	57.8594
Detah	12932.0	4032.00	90.4336	0.00000	0.00000
Enterprise	4396.00	768.000	109.900	0.00000	0.00000
Fort Liard	27060.0	15825.0	78.6628	36.3956	22.1831
Fort Providence	108092.	33563.0	189.303	115.273	46.1541
Fort Resolution	66714.0	31416.0	127.560	94.1351	39.7839
Fort Simpson	231185.	49002.0	230.954	144.068	72.2278
Fort Smith	421161.	165276.	188.523	164.087	83.1338
Hay River	862795.	199548.	257.936	212.698	96.6996
Jean Marie River	6037.00	3552.00	123.204	25.2632	40.2245
Kakisa	1344.00	1344.00	37.3333	0.00000	0.00000
Lac la Martre	13510.0	9048.00	58.4848	49.3111	17.4069
Nahanni Butte	6181.00	3191.00	67.1848	30.5862	24.3043
Paradise Gardens	0.00000	0.00000	0.00000	0.00000	0.00000
Pine Point	.158200E7	107728.	920.564	178.798	907.504
Port Radium	104922.	0.00000	749.443	0.00000	0.00000
Rae Lakes	7104.00	7104.00	35.5200	0.00000	0.00000
Rae Edzo	68561.0	30964.0	50.1544	99.0596	32.9905
Snare Lakes	0.00000	0.00000	0.00000	0.00000	0.00000
Snowdrift	21981.0	11326.0	83.2614	96.3529	31.5947
Trout Lake	3838.00	3648.00	62.9180	0.00000	0.00000
Tungsten	44806.0	0.00000	88.5494	0.00000	0.00000
Wrigley	17493.0	9989.00	107.319	71.4815	46.4601
Yellowknife	.301100E7	676480.	303.584	115.714	171.708
Sum or Average	.107130E8	.286778E7	232.685	126.049	117.737

5.2 SUMMARIES OF BASELINE DATA: Oil Consumption Summary

The summaries of baseline oil consumption data are shown at the end of this section. These include the oil used for electricity, oil used for space heating, per capita oil consumption and total cost of oil consumed.

A detailed examination of oil used for space heat is presented in Table 5.2.1. Per Capita uses are shown to reduce the impact of high populations. The lowest averages are found in the Prairies and Ontario where the population is predominantly native, and wood is used for most heating. Moderate values are found in Quebec, which has a mixed population and higher uses of oil for space heat in the north and in the Magdalen Islands. B C, the Yukon and the Northwest Territories have a high oil use because of the dominance of industrial communities in B C and the proportion of government housing using oil heat in the Territories. Climatic variations do not make as big a difference to the energy used for space heat because of lifestyle changes and better insulation standards in the northern areas.

An examination of the per capita electricity use is presented in Table 5.2.2. The pattern of use is dominated by similar factors involved in other energy uses, namely the low industrial component affecting Newfoundland, Ontario and the Prairies, lack of restrictions on space heat in Quebec, and the high industrial component in B C, the Yukon and the Northwest Territories. Note in particular the median use in the Northwest Territories, which is much lower than the average. The median represents the "typical" community, which has such high power rates that consumption is depressed. The average values are greatly increased by the few areas where hydro power is used and where mines are major power users.

The data summary tables for oil consumption which follow Table 5.2.2 are based on the community data presented in Appendix 4. The data is organised as follows:

Community Name: See introduction to Energy and Electricity tables, Section 5.1.

Oil Used for Electricity: Includes the oil used by diesel generators, but does not include hydro generated electricity. All community sectors included.

Oil Used for Space Heating: Includes the oil used by all community sectors for nonelectrical purposes, and the oil used to genrate electricity for space heat.

Per Capita Oil Consumption: The total of the first two categories divjded by the population.

Total Cost of Oil Consumed: The sum of the reported oil volumes multiplied by the reported pirces for both the electricity and space heat sectors. The costs are a composite for the reporting years indicated in Table 4.1.

Data Anomalies: Refer to explanations, Section 5.1.

TABLE 5.2.1

OIL USED FOR SPACE HEAT (PER CAPITA) IN REMOTE COMMUNITIES (GJ)

Region	Median Use	Low	Avg	High
Newfoundland	27.3	3.5	27.7	122.9
Quebec	35.6	10.5	43.6	453
Ontario	10.9	0.0	14.4	71.7
Manitoba	12.8	6.4	20.7	74.8
Saskatchewan	18.2	0.0	24.4	93.9
Alberta	0.7	0.0	11.4	25.4
B C	51.8	0.0	86.9	4025
Yukon	79.8	13.7	94.7	349
N W T	58.3	3.1	101.4	1722

NOTES:

1. Communities with no information have not been included in the "low" range.

2. Low values are found in communities which have limited information (Peerless Lake AB) (Trout Lake BC) where wood heat predominates, and where there are limited community services which might normally use oil (Granville Lake MB).

3. High values are found at industrial communities such as Asbestos Hill PQ, Oba ON, and Norman Wells NWT. Nonindustrial communities with high loads include Paradise River Labrador, which has a very high reported space heat load (possibly an error); Fort Chipewyan AB, which has a large population and limited use of wood; and Stony Rapids Sask, which has a high load in the community building sector.

TABLE 5.2.2

PER CAPITA ELECTRICITY USE IN REMOTE COMMUNITIES (GJ)

Region	Median Use	Low	Avg	High
Newfoundland	27.9	6.3	37.0	86.2
Quebec	56.9	14.8	121.9	1150
Ontario	14.7	0	19.3	125.4
Manitoba	20.9	12.5	43.1	192.4
Saskatchewan	29.9	17.4	29.2	76.5
Alberta	17.1	7.7	21.1	28.0
B C	75.2	0	107.2	11920
Yukon	90.7	16.1	193.8	1056
N W T	32.9	17.4	117.7	908

NOTES:

1. Zero values resulting from no information have not been included.
2. Zero values result from lack of community power facilities such as in Moose River Crossing ON, and a number of communities in BC and NWT. Other low values are explained by seasonal use (Tagish YT).
3. High values result from industrial activities. Where there are limited industries high values are explained by inefficient generators (Camsell Portage Sask and Peerless Lake AB) and by a higher proportion of commercial activities than the regional normal such as St Anthony Newfoundland.

TABLE 5.2.3 - Oil consumption for Newfoundland

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Black Tickle	12207.0	5756.00	92.5928	178.720
Cartwright	22074.0	12128.0	51.9787	343.245
Charlottetown	6708.00	5961.00	50.6760	127.292
Davis Inlet	7410.00	5139.00	52.2873	126.009
Hopedale	13611.0	13361.0	63.4635	271.070
L'Anse au Loup	19617.0	22611.0	71.6944	395.283
-Capstan Island	1911.00	0.00000	24.8182	17.1500
-English Point	0.00000	0.00000	0.00000	0.00000
-Forteau	15132.0	15417.0	58.7481	271.562
-Fox Cove	0.00000	0.00000	0.00000	0.00000
-L'Anse Amour	0.00000	0.00000	0.00000	0.00000
-L'Anse au Clair	10491.0	7194.00	66.2250	157.501
-L'Anse au Diable	0.00000	0.00000	0.00000	0.00000
-Pinware	3588.00	3083.00	33.1891	59.3459
-Red Bay	8892.00	8633.00	55.4589	155.822
-West St. Modeste	6747.00	8839.00	57.0916	138.356
Makkovik	19617.0	9250.00	83.1902	289.604
Mary's Harbour	12402.0	5139.00	42.9926	178.591
-Lodge Bay	1287.00	1439.00	21.9839	26.8307
Mud Lake	3393.00	1850.00	72.8194	42.3022
Nain	28665.0	26722.0	59.0480	556.569
Paradise River	3627.00	11306.0	162.315	150.472
Port Hope Simpson	11544.0	2056.00	23.4079	147.751
Postville	12285.0	3063.00	68.9148	155.555
Rigolet	11622.0	3063.00	54.2621	167.851
St. Lewis	10296.0	6793.00	60.9964	174.957
William's Harbour	4290.00	2467.00	86.6282	72.5751
Croque	4680.00	2981.00	52.1156	60.7062
Harbour Deep	10764.0	2631.00	48.1835	135.579
Main Brook	14469.0	12091.0	51.6732	204.669
Roddickton	29913.0	20000.0	43.7067	383.010
-Bide Arm	8385.00	3493.00	35.0383	103.295
-Conche	7644.00	15436.0	49.7414	192.536
-Englee	28002.0	14742.0	42.8297	373.100
Saint Anthony	152880.	118637.	87.3888	2147.00
-Boat Harbour	702.000	6009.00	31.8057	55.4600
-Cape Onion - Ship Cove	1287.00	7671.00	32.1075	74.3326
-Cook's Harbour	5460.00	13177.0	48.0305	156.846
-Goose Cove East	3159.00	9025.00	33.1087	102.314
-Great Brehat	1482.00	0.00000	12.3500	13.3000
-Hay Cove et al	819.000	11431.0	28.9915	100.906
-Raleigh	2262.00	10228.0	33.4953	104.010
-St. Anthony Bight	2145.00	10529.0	59.2243	105.424
-St. Carrol's	1404.00	0.00000	15.2609	12.6000
-St. Lunaire - Grandois	8229.00	21810.0	29.7416	252.352
-Wild Bight	741.000	0.00000	13.7222	6.65000
St. Julian's - Grandois	3295.50	2806.00	45.1963	48.6061
Change Islands	18525.0	14029.0	56.1276	273.723
Fogo	36894.0	41211.0	70.6833	652.668
-Deep Bay	2340.00	5612.00	52.3158	67.3670
-Island Harbour	6825.00	8067.00	52.9964	127.900
-Joe Batt's Arm et al	25584.0	48226.0	63.9046	628.047
-Seldom	20475.0	16660.0	66.3125	321.397
-Stag Harbour	6591.00	11925.0	59.7290	157.676
-Tilting	7878.00	16660.0	57.4660	208.347

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Little Bay Islands	15054.0	14906.0	73.6118	235.480
St. Brendan's	6864.00	13328.0	43.1453	222.354
-Dock Cove	1287.00	0.00000	14.6250	11.5500
-Hayward's Cove	858.000	0.00000	14.7931	7.70000
-Shalloway Cove	2262.00	0.00000	14.5935	20.3000
Westport	12675.0	5261.00	38.4069	141.103
-Purbeck's Cove	1326.00	1753.00	50.4754	26.4289
Burgeo	127179.	77164.0	81.6066	1748.00
Francois	8814.00	7647.00	75.1644	152.940
Grand Bruit	4251.00	2665.00	86.4500	60.9278
Grey River	5811.00	7576.00	57.2094	99.6410
La Poile	4641.00	6173.00	58.1398	91.6219
McCallum	6396.00	6314.00	52.3045	101.540
Monkstown	5187.00	3647.00	78.8750	68.6226
Petites	4524.00	3788.00	76.9630	68.6939
Petit Forte	4914.00	2946.00	87.3333	70.3085
Ramea	65247.0	42790.0	77.9488	1009.00
Rencontre East	7410.00	7015.00	62.7174	133.891
South East Bight	3537.30	3788.00	63.6983	60.3449
Total or Avg.	948488.	833148.	59.1729	15604.7

TABLE 5.2.4 -
Oil consumption summary for Quebec

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Akulivik (Cape Smith)	8424.00	15100.0	97.6100	320.007
Asbestos Hill	231114.	90500.0	1608.07	4300.00
Aupaluk	5577.00	5930.00	112.814	157.085
Inukjuak (Port Harrison)	29913.0	49000.0	121.405	1028.00
Ivujivik (C. Wolstenholme)	8229.00	12500.0	112.658	269.630
Kangiksuk (Payne Bay)	13104.0	15600.0	102.882	371.381
Kangiqsualujjuaq(George R)	13689.0	17300.0	93.0601	401.476
Kangiqsujuaq (Maricourt)	13104.0	20800.0	121.520	441.414
Killinik	0.00000	0.00000	0.00000	0.00000
Kuujjuak (Fort Chimo)	73476.0	96700.0	159.341	2207.00
Kuujjuaraapik (P. Baleine)	60918.0	115000.	155.267	2392.00
Povungnituk	26403.0	51700.0	103.860	1021.00
Quaqtaq	10296.0	12400.0	139.239	293.723
Salluit	15795.0	31000.0	90.3378	611.908
Tasiujak (Leaf Bay)	5577.00	7360.00	122.047	176.345
Uumaruk	0.00000	0.00000	0.00000	0.00000
Belleterre	0.00000	12200.0	25.9574	104.273
Clova	9399.00	5620.00	75.0950	118.377
Eastmain	19890.0	7000.00	81.7325	215.320
Fort Rupert	35100.0	32200.0	71.1417	543.893
Gagnon	0.00000	147000.	42.0000	875.679
Kawawchikamach	0.00000	0.00000	0.00000	0.00000
Lac Rapide	15600.0	5813.00	63.5401	172.178
Obedjiwan	16380.0	11600.0	25.3672	223.336
Parent	48984.0	23400.0	90.4800	552.557
Schefferville	0.00000	0.00000	0.00000	0.00000
Selbaie	409851.	87250.0	497.101	3703.00
Wemindji	28080.0	26700.0	81.2760	547.365
Weymontachie	14820.0	8720.00	38.4013	230.222
Anticosti	42900.0	61000.0	463.839	879.568
La Romaine	41730.0	16900.0	114.736	503.867
La Tabatiere	36816.0	13000.0	94.7072	428.704
-Aylmer Sound	4173.00	0.00000	37.9364	37.4500
-Chevery	20670.0	0.00000	90.6579	185.500
-Harrington Harbour	20436.0	19600.0	128.733	345.845
-Mutton Bay	14976.0	0.00000	57.6000	134.400
-Tete a la Baleine	29328.0	4790.00	76.4978	302.900
Lourdes de Blanc Sablon	75231.0	19700.0	151.890	819.134
-Blanc Sablon	27222.0	82000.0	302.554	923.916
-Bradore Bay	10725.0	0.00000	87.1951	96.2500
-Middle Bay	6591.00	0.00000	46.0909	59.1500
-Old Fort Bay	15015.0	0.00000	48.1250	134.750
-St. Paul's River	30030.0	0.00000	60.6667	269.500
St. Augustin	57759.0	12600.0	66.4391	607.969
Cap-aux-Meules	155415.	48000.0	150.678	1389.00
-Etang du Nord	269685.	101000.	137.189	2548.00
-Fatima	234273.	123000.	114.916	2487.00
-Grand Entree	73125.0	37000.0	112.487	765.615
-Grosse Ile	29718.0	16000.0	87.4149	318.630
-Havre aux Maison	175968.	91000.0	106.787	1858.00
-Havre Aubert	201123.	112000.	105.287	2185.00
Iles d'Entree	12558.0	5300.00	115.961	153.881
Total or Avg.	.269919E7	.167128E7	114.022	38711.2

TABLE 5.2.5 -

Oil consumption summary for Ontario

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Attawapiskat	16321.5	11615.0	33.7397	315.328
Fort Albany	29035.5	9534.00	86.2852	406.450
Fort Severn	5612.10	3516.00	28.7047	220.867
Kashechewan	0.00000	11884.0	14.8922	138.508
Winisk	7215.00	0.00000	31.0991	142.450
Allan Water	721.500	560.000	25.6300	16.5020
Armstrong	22323.6	43896.0	82.7745	484.094
Auden	0.00000	1657.00	19.4941	11.1582
Biscotasing	3432.00	967.000	32.5852	29.7640
Collins	1482.00	928.000	24.1000	31.0176
Ferland	1150.50	281.000	17.6728	8.60836
Graham	4660.50	985.000	62.7278	52.0296
Hillsport	4559.10	2631.00	105.737	54.3439
Moose River Crossing	0.00000	1757.00	19.5222	18.2025
Oba	7230.60	5380.00	168.141	81.1855
Ramsey	16060.2	8730.00	195.198	166.260
Sultan	8123.70	6725.00	82.9536	108.153
Angling Lake(Wapekaka)	0.00000	1292.00	6.27184	21.4162
Bearskin Lake	0.00000	5245.00	15.6101	74.7153
Big Trout Lake	10701.6	6327.00	22.7048	248.631
Cat Lake	0.00000	3961.00	12.5746	46.1655
Deer Lake	0.00000	5111.00	10.6258	72.8062
Fort Hope	5311.80	6360.00	16.5557	159.775
Gull Bay	1684.80	1403.00	10.7965	20.4053
Kasabonika	0.00000	2901.00	6.53378	48.0870
Kingfisher	0.00000	2027.00	8.01186	33.5996
Lac Seul	0.00000	1332.00	2.48045	9.65966
Lansdowne House	5912.40	4124.00	48.0211	148.983
Long Dog Lake	0.00000	0.00000	0.00000	0.00000
MacDowell	0.00000	0.00000	0.00000	0.00000
Muskrat Dam	0.00000	1379.00	7.97110	19.2867
North Spirit Lake	0.00000	2192.00	7.77305	31.2250
Ogoki/Marten Falls	0.00000	4757.00	31.7133	80.0839
Pikangikum	9769.50	6970.00	17.6950	182.947
Ponask	0.00000	522.000	16.8387	7.43589
Poplar Hill	0.00000	1319.00	7.71345	18.7892
Sachigo	0.00000	2615.00	7.71386	37.2507
Sandy Lake	22986.6	14931.0	28.2125	472.028
Slate Falls/Fry Lake	0.00000	60.0000	0.73171	0.88578
Summer Beaver	3221.40	215.000	13.7456	34.4228
Weagamow(Caribou Lake)	8541.00	9085.00	33.1940	191.296
Webequie	4800.90	6747.00	25.3800	161.354
Wunnummin Lake	0.00000	2127.00	6.68868	35.2572
Total or Avg.	200858.	204048.	28.5991	4441.43

TABLE 5.2.6 -
Oil consumption summary
for Alberta

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Fort Chipewyan	45669.0	40600.0	53.9181	777.889
Jean d'Or Prairie	11427.0	1640.00	20.1031	117.417
Fox Lake	13455.0	530.000	18.6467	125.554
Trout Lake AB	6123.00	0.00000	30.1626	54.9500
Peerless Lake	6201.00	0.00000	30.3971	55.6500
Chipewyan Lake	2730.00	90.0000	18.8000	25.3159
Peace Point	0.00000	300.000	4.61538	2.71950
Garden Creek	0.00000	0.00000	0.00000	0.00000
Total or Avg.	85605.0	43160.0	34.1371	1159.50

Oil consumption summary for : Saskatchewan

Oil consumption summary
for Saskatchewan

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Black Lake	11154.0	8242.00	26.9389	173.343
Bratant	4379.70	1548.00	45.9512	45.0915
Camsell Portage	2691.00	1781.00	73.3115	34.4119
Deschambault	13306.8	8012.00	41.2356	167.455
Fond du Lac	11793.6	22253.0	63.0493	297.940
Garson Lake	0.00000	0.00000	0.00000	0.00000
Kinoosao	3507.66	1742.00	64.8106	47.0241
Southend	10767.9	7315.00	34.2479	149.026
Stony Rapids	13115.7	23375.0	146.549	322.202
Wollaston	13537.7	9908.00	43.1781	200.263
Total or Avg.	84254.0	84176.0	48.7920	1436.76

Oil consumption summary for Manitoba

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Brochet	14664.0	11224.0	40.4500	258.308
Garden Hill	45162.0	24228.0	38.5500	596.462
God's Lake Narrows	26442.0	16137.0	34.0632	389.340
God's River	7293.00	2593.00	39.5440	106.891
Granville Lake	1755.00	890.000	18.8929	27.4619
Lac Brochet	5265.00	3637.00	23.4263	104.615
Oxford House	23244.0	15711.0	31.1640	337.209
Pikwitonei	6747.00	4798.00	56.8719	91.1784
Pukatawagan	19110.0	7818.00	24.4800	208.920
Red Sucker Lake	8307.00	5457.00	32.3859	133.214
St. Theresa Point	29055.0	16525.0	31.4345	392.479
Shamattawa	9828.00	6308.00	23.7294	205.916
Tadoule Lake	3783.00	2671.00	30.0186	94.1655
Thicket Portage	6708.00	5728.00	62.1800	96.8372
Waasagomach	17550.0	10991.0	39.0973	246.480
Churchill	310869.	119661.	269.081	3889.00
Total or Avg	535782.	254377.	64.1727	7179.48

TABLE 5.2.7 - Oil consumption summary for B.C.

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
ACTEON SOUND	5694.00	4785.00	232.867	99.7968
ANAHIM LAKE	24102.0	33583.0	155.067	485.412
ATLIN	29250.0	43981.0	154.171	788.825
BAKER MINE CAMP	62400.0	120750.	6105.00	2884.00
BAMFIELD	0.00000	33760.0	302.220	672.375
BARCLAY DIV.(KILDONAN)	5694.00	4785.00	232.867	99.7968
BARR CREEK	0.00000	197.000	7.88000	2.04092
BELLA BELLA	95550.0	51540.0	104.024	1202.00
BELLA COOLA	78000.0	76713.0	50.7755	1362.75
BIG BAR/JESMOND CREEK AREA	0.00000	1148.00	37.9549	46.8933
BOB QUINN LAKE	0.00000	15199.0	1362.82	228.979
BOULDER BAY	0.00000	366.000	101.733	41.5918
CASSIAR	556959.	688369.	673.151	12270.0
CHRISTIAN VALLEY	0.00000	1399.00	60.8261	11.9573
CLEAGH CREEK	14196.0	13035.0	605.133	233.931
DEASE LAKE	36855.0	63491.0	236.108	1128.00
DOME CREEK / CRESCENT SPUR	0.00000	10351.0	21.7916	117.960
DRURY INLET	14196.0	13039.0	605.222	233.963
EARLS CREEK	0.00000	190.000	7.60000	1.96840
EASTGATE	2925.00	3805.00	134.600	75.9748
ERICKSON GOLD MINE VILLAGE	96330.0	0.00000	741.000	815.100
FIELD	17550.0	1258.00	69.6593	161.698
FORT BABINE IR #6	0.00000	2443.00	14.3706	27.8404
FORT WARE	0.00000	353.000	2.43448	3.65708
GERMANSEN LANDING	0.00000	1824.00	23.6883	18.8966
GILFORD ISLAND	0.00000	592.000	19.8955	15.7931
GOOD HOPE LAKE - HIGHWAYS	8073.00	8611.00	1390.33	159.969
GREENWOOD CAMP	4095.00	406.000	70.3281	40.9562
HARTLEY BAY	14235.0	13773.0	130.879	331.992
HESQUIAHT	2340.00	1112.00	38.3556	36.1203
HOLBERG	41340.0	52920.0	198.025	738.912
HOLBERG DND	62049.0	15148.0	118.765	646.003
HORNET	0.00000	282.000	9.40000	2.92152
ISKUT/EDDONTENAJON	12090.0	49136.0	244.904	606.078
JUSKATLA	18213.0	21029.0	392.420	347.855
KILBELLA BAY	4095.00	5977.00	165.115	85.1875
KINGCOME INLET	25.7400	5130.00	38.4757	53.4900
KINGCOME INLET (WHONNOCK)	14196.0	13522.0	615.956	237.816
KITKATLA	13494.0	19291.0	70.8099	388.993
KLEMTU	1170.00	13236.0	46.0256	169.265
KNIGHT INLET	5694.00	4785.00	232.867	99.7968
KYUQUOT	0.00000	1424.00	4.74667	16.9655
LASQUETI ISLAND	0.00000	993.000	2.17287	14.1453
LONGWORTH	0.00000	732.000	13.8113	7.58352
LOWER POST	0.00000	3249.00	26.4146	33.6596
MACHMELL	5694.00	4785.00	232.867	99.7968
MAHATTA RIVER	18252.0	31933.0	250.925	397.880
MANNING PROVINCIAL PARK	28470.0	13826.0	349.554	338.990
MASSET	185640.	230229.	130.982	3413.00
MCNAB CAMP	4563.00	4604.00	381.958	86.8186
MEZIADIN LAKE - HIGHWAYS	8190.00	12193.0	1199.00	226.094
MOOYA BAY (NOOTKA)	5694.00	4785.00	232.867	99.7968
MOSES INLET	4407.00	422.000	68.9857	54.0919

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
NARROWS INLET LOGGING DIV.	5694.00	4431.00	225.000	89.2434
NAZKO INDIAN BAND	0.00000	1283.00	11.3540	19.9378
NEMAIAH VALLEY INDIAN BAND	0.00000	1368.00	7.81714	21.2587
NICKNAQUEET	0.00000	352.000	8.80000	3.64672
NITINAHT	3237.00	3332.00	81.0988	64.7315
NUCHATLAHT	0.00000	53.0000	8.80000	3.23241
OWIKENO	0.00000	4199.00	169.289	99.3888
PENNY	0.00000	1070.00	14.4595	11.0852
PHILLIPS ARM	5694.00	4785.00	232.867	99.7968
PITT LAKE	5694.00	4785.00	232.867	99.7968
PORT DOUGLAS (HARRISON)	5694.00	4785.00	232.867	99.7968
PORTAGE (NANCUT)	0.00000	1282.00	13.4947	13.2815
PROPHET RIVER	1404.00	2270.00	47.1026	43.3172
QUATAM RIVER	5694.00	4785.00	232.867	99.7968
SANDSPIT	186030.	155256.	113.762	2755.00
SAVARY ISLAND	0.00000	252.000	8.12903	2.61072
SCOTT COVE	14196.0	13040.0	605.244	233.971
SCOTTY GOLD	0.00000	939.000	11.7375	9.72804
SECHELL CREEK	5694.00	4785.00	232.867	99.7968
SEWELL INLET	20904.0	27351.0	265.137	445.335
SEYMOUR ARM	0.00000	3695.00	26.0211	42.1082
SEYMOUR INLET	14196.0	13039.0	605.222	233.963
SHEEMAHANT	3900.00	6276.00	216.511	102.543
SHOTBOLT	0.00000	352.000	8.80000	3.64672
SIMOON SOUND	0.00000	253.000	7.90625	2.71937
STAVE LAKE	0.00000	1850.00	85.4000	44.7160
STEWART	156000.	109047.	182.038	2169.00
TAKLA	0.00000	818.000	3.93269	13.9829
TATLA LAKE	14430.0	8010.00	606.486	176.872
TELEGRAPH CREEK	14274.0	7351.00	61.7857	192.175
TIDE LAKE	0.00000	1455.00	11.6400	15.0738
TIMFOR	5694.00	4785.00	232.867	99.7968
TOAD RIVER AREA	0.00000	2833.00	35.4125	33.7524
TOM BROWN LAKE	5694.00	4785.00	232.867	99.7968
TROUT LAKE BC	0.00000	0.00000	0.00000	0.00000
VERNON	28470.0	27576.0	223.291	534.518
WAKEMAN SOUND	5694.00	5140.00	240.756	103.474
WESTERN MINES (MYRA FALLS)	46800.0	413.000	1573.77	424.279
WOSS	68328.0	36672.0	191.606	1008.00
Total or Avg.	.212514E7	.219524E7	171.091	41380.6

TABLE 5.2.8 -

Oil consumption summary for Yukon

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Dawson City	90987.0	130100.	245.652	2851.30
Watson Lake	104247.	111500.	189.252	2391.00
Whitehorse	0.00000	.143500E7	95.6667	14870.0
Faro	0.00000	137646.	80.9682	1604.00
Mayo	0.00000	40108.0	80.2160	467.460
Elsa	0.00000	139685.	349.212	1628.00
Keno	0.00000	4274.00	47.4889	49.8136
Beaver Creek	13533.0	16680.0	335.700	389.506
Burwash Landing	5031.00	1278.00	90.1286	72.9451
Destruction Bay	8853.00	9182.00	225.438	209.166
Carcross	0.00000	12406.0	45.9481	131.739
Carmacks	0.00000	19155.0	56.3382	218.291
Haines Junction	0.00000	36691.0	79.7630	389.622
Johnsons Crossing	1794.00	300.000	209.400	22.0457
Old Crow	9906.00	6146.00	66.8833	260.304
Pelly Crossing	10218.0	4887.00	83.9167	170.972
Ross River	0.00000	18394.0	56.5969	219.146
Stewart Crossing	5889.00	3355.00	462.200	107.053
Swift River	4641.00	4530.00	262.029	99.2573
Tagish & Marsh Lake	0.00000	8000.00	16.6667	84.9520
Teslin	21684.0	19945.0	113.122	450.482
Upper Liard	3510.00	1787.00	40.7462	58.6018
Total or Avg.	280293.	.216105E7	106.945	26745.7

Oil consumption summary for : NWT

Oil consumption summary for the Northwest Territories

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Arctic Bay	14391.0	28439.0	113.607	597.008
Broughton Island	11817.0	41100.0	168.525	642.720
Cape Dorset	28353.0	64900.0	128.625	1276.00
Clyde River	14703.0	31217.0	103.657	604.615
Frobisher Bay	215514.	199150.	168.975	4754.00
Grise Fiord	7566.00	13611.0	222.916	300.589
Hall Beach	11505.0	25919.0	94.5025	521.789
Igloolik	25740.0	69714.0	124.614	1257.00
Lake Harbour	0.00000	18332.0	61.1417	242.294
Nanisivik	0.00000	88876.0	305.751	921.631
Pangnirtung	27261.0	62444.0	98.6854	1204.00
Pond Inlet	27729.0	63634.0	140.127	1250.00
Resolute	89193.0	27894.0	661.508	1776.00
Sanikiluaq	70824.0	19480.0	270.371	837.413
Baker Lake	44382.0	71232.0	113.681	1641.00

Community name	Oil Used for Electricity (GJ)	Oil Used for Space Heating (GJ)	Per Capita Oil Consumption (GJ)	Total Cost of Oil Consumed ($1000)
Chesterfield Inlet	11505.0	29829.0	147.096	576.488
Coral Harbour	28548.0	24007.0	126.944	744.580
Eskimo Point	30108.0	72004.0	104.196	1424.00
Rankin Inlet	70902.0	110407.	189.654	2526.00
Repulse Bay	15405.0	25765.0	125.518	563.026
Whale Cove	9516.00	19039.0	140.665	390.668
Bathurst Inlet	0.00000	0.00000	0.00000	0.00000
Cambridge Bay	52650.0	116109.	195.323	1675.00
Coppermine	27885.0	54694.0	107.805	1194.00
Gjoa Haven	14664.0	36657.0	104.099	861.520
Holman	10920.0	16290.0	80.9821	407.108
Pelly Bay	10179.0	24682.0	124.061	684.201
Spence Bay	20436.0	47939.0	145.479	1148.00
Aklavik	30966.0	63826.0	126.389	939.136
Arctic Red River	4173.00	4568.00	110.646	110.402
Colville Lake	0.00000	248.000	3.39726	4.81740
Fort Franklin	14976.0	25235.0	72.5830	560.297
Fort Good Hope	14898.0	21096.0	80.7040	427.058
Fort McPherson	28743.0	62754.0	117.154	1039.00
Fort Norman	14274.0	22334.0	117.333	434.447
Inuvik	299208.	218572.	179.039	4950.00
Norman Wells	50583.0	621611.	1862.03	6894.00
Paulatuk	7098.00	8540.00	94.2048	225.784
Sachs Harbour	13026.0	13095.0	153.653	383.702
Tuktoyaktuk	43524.0	62496.0	141.928	1477.00
Detah	0.00000	8900.00	62.2378	92.2040
Enterprise	0.00000	3628.00	90.7000	37.5861
Fort Liard	7683.00	7333.00	43.6512	201.201
Fort Providence	26559.0	80202.0	186.972	1069.00
Fort Resolution	0.00000	38611.0	73.8260	400.008
Fort Simpson	72891.0	150629.	223.297	2215.00
Fort Smith	16731.0	196464.	95.4320	2186.00
Hay River	325962.	351861.	202.638	6571.00
Jean Marie River	1989.00	994.000	60.8776	42.9770
Kakisa	0.00000	0.00000	0.00000	0.00000
Lac la Martre	4056.00	3537.00	32.8701	117.365
Nahanni Butte	2223.00	1641.00	42.0000	52.7360
Paradise Gardens	0.00000	0.00000	0.00000	0.00000
Pine Point	56043.0	22448.0	45.6609	735.511
Port Radium	0.00000	104922.	749.443	1087.00
Rae Lakes	0.00000	0.00000	0.00000	0.00000
Rae Edzo	0.00000	21351.0	15.6189	221.196
Snare Lakes	0.00000	0.00000	0.00000	0.00000
Snowdrift	8385.00	9800.00	68.8826	220.345
Trout Lake	0.00000	190.000	3.11475	3.59233
Tungsten	0.00000	44806.0	88.5494	464.192
Wrigley	7644.00	4736.00	75.9509	149.771
Yellowknife	254397.	.108900E7	135.441	13540.0
Total or Avg.	.219773E7	.466879E7	149.139	76873.0

5.3 PROJECTION OF ENERGY TRENDS WITH AND WITHOUT ALTERNATIVE ENERGY AND CONSERVATION MEASURES

5.3.1 Introduction

One of the objectives of the Energy Overview of Canada's Remote Communities was to calculate the existing use of energy in remote communities in terms of quantity and cost and determine the fraction of the total energy provided by oil. This information has been described in Sections 5.1 and 5.2. The establishment of the existing energy use scenario allows the projection of future growth trends and savings potentials in this section. The projections described are averages and individual communities can be expected to differ from the averages significantly because of their individual circumstances.

All remote communities can reduce total energy consumption through conservation. The techniques available include insulation, energy management and waste heat utilization (where diesels are used). Other methods such as water heat savings and efficiency improvements can be deemed to fall into one of the first named categories. Usually the costs of insulation, energy management and waste heat conversions are much more predictable than the costs of alternative sources of energy supply. Substituting an alternative electrical supply to diesel generation will save the inefficient portion of the fuel energy, but will not conserve electrical energy.

The area where communities differ is in the availability of alternatives to oil for electrical generation and space heat. Alternatives to oil for electricity generation include small hydro, grid connections, natural gas fueled generators, wood gasification, wind turbines, wood fired steam turbines, coal fired steam generators and solar cells. Of these alternatives, each region of the country has the resource base to make one or two types potentially viable while the remaining resources are clearly not viable. There are also variations across any one region, simply because the regions themselves often span several geologic, climatic and vegetation zones.

Similarly, alternatives for space heat include wood, small hydro, grid connections, waste heat from existing generation, peat, coal and solar. Of these alternatives, wood is by far the most common, but even it has limitations in certain northern or barren-ground communities. Wood and the other resources are all dependent on site specific conditions which govern their economics. The alternatives are described in Section 2.2.

5.3.2 Energy Projections in Remote Communities

The projections of energy growth assuming no change in the present means for utilization of energy are shown in the summary tables at the end of this section. The regional totals are combined in Table 5.3.1 for ease of comparison. Both sets of tables also provide projections if certain feasible conservation and alternative energy methods are implemented.

The analysis of projected energy consumption considers the remote communities in 1992 and 2002, 10 and 20 years beyond the present level of information. In these years the projected energy is mostly dependent on population growth, as information on any industry which may increase the energy use is usually not available. The headings used include the "status quo" energy and oil use cases in which there is no attempt made to upgrade the existing energy systems. However it is assumed that electricity use grows linearly with population while growth in space heat occurs in newly constructed well insulated houses. The "alternatives" case deducts from the status quo case the potential energy savings from upgrading insulation in residences and converting oil heated residences to wood heat, where feasible. The range of feasible electrical generation and energy conservation options is assumed to apply as listed in Table 2.1. A more detailed discussion is provided in Appendix 1. Note that judgement is exercised, for example it is recognized that wood heat is an option which may not be justified in an industrial forest community, when the costs of harvesting and operation are considered.

The population projections are based on 10 and 20 years growth expectations provided in the regional overviews. Where no population growths were given, projections were made based on communities in a similar socio-economic category. In general, resource development towns were considered to have zero population growth. One mining town, Cassiar BC, was projected to close after 10 years and its energy totals cut 100%, which has a measurable impact on the BC energy total. Nonindustrial towns averaged growth rates of 1 - 2%, with some exhibiting no growth. It is likely that in these areas, changes in lifestyle and the existing energy use and supply systems would have a greater impact on energy use than population change.

Observations

Using Table 5.1.2 for existing energy levels and Table 5.3.1 for future levels, the average growth in remote communities for energy and oil use is 3% and 15% respectively in 1992 and 14% and 29% respectively in 2002, assuming the status quo. The larger growth in oil use occurs because existing developed hydro capacity accessible to remote communities is used up, and some areas have limited forests to maintain the wood/oil heat ratio. In contrast growth in energy use and oil use could be limited to -21% and -49% respectively in 1992 and -10% and -38% respectively in 2002 with the implementation of conservation measures and alternative energy sources. This translates into a future annual oil savings potential of 10.4 PJ (268 M litres of oil) in year 10 assuming all of the feasible conservation and alternative energy options are utilized. The projected per capita oil use in remote communities could decline from 108 GJ to 50 GJ (54%) based on an average population growth rate of 1%/annum to Year 10. In general, energy growth should be less than population growth because of little change in existing commercial/institutional requirements and new house construction being to higher standards.

Regional energy and oil projections show results ranging from a decline of about 75% in oil use (Newfoundland and BC) to a decline of about 45% in oil use (Northwest Territories) over 10 years. The main reason for this difference is the larger amount of untapped hydro and wind resources in Newfoundland and hydro and wood resources in B.C. while the Northwest Territories have limited off-oil options. Such statistical comparisons must always be taken in context and simply used to compare one region with itself, because of regional anomalies involving data quality, industrial energy uses and existing uses of renewable energy.

Within the community projections, the major point concerns communities where the projected consumption with alternatives is zero. This usually means that the combined hydropower and wood resource is sufficient to cover all community energy needs. The exception exists where the total energy is also zero, in which case there is likely a shortage of data.

Summary of Energy Conservation Potential in Remote Communities

The magnitude of the energy trend projections in remote communities varies greatly, from communities which have the potential to be off-oil completely to those in which only a modest reduction in oil use can occur. The largest reductions occur where there are unutilized hydro and wood resources. Communities which have a low oil reduction potential may be those in which existing oil use is low, for example a remote native community in which only community buildings have power and oil heat, while the residents have wood heat and no power. An improved energy delivery system may actually increase their energy use. This problem of making comparisons between communities in which individuals live a traditional life style and those communities which have all of the expected amenities of a town will always exist in Canada. Therefore results in this study must always be considered in terms of the location, lifestyle, standard of living and economic basis of each community.

It is important to consider various cultural and geographic aspects when programs for individual communities are planned, but it is also useful to take the remote communities as a group to put the Remote Community Demonstration Program in perspective. The analysis shows that the total population in remote communities is 196,255, roughly 0.8% of the total population of Canada. The study has shown that energy use (excluding the transportation sector) amounts to 181 GJ per capita in remote communities, compared with the 1982 Statistics Canada report of 165 GJ for Canada as a whole. Although a figure is not available for the potential to reduce energy consumption in all of Canada, the analysis in the report shows that remote communities have a potential reduction of up to 21% in total energy and 49% in use of oil in 10 years, assuming full implementation of all feasible alternatives.

At first glance, the results indicate that the overall use of energy in remote communities on a per capita basis is not excessive compared with the non remote communities. However, it must be realized that the typical remote community has a lower per capita income, larger family size and lower standard of living (including lower use of electric power) hence comparing the average of all remote communities with the national average (dominated by larger cities) is not as meaningful. The preceding factors tend to make the impact of energy costs on the average head of household much more severe. A better comparison can be made by examining the energy in Whitehorse, Yukon which is a fully serviced remote community with a mixed economic base. Even though the cold weather accounts for some increased proportion of the energy use, the overall use of 222 GJ per capita is 95% more energy per capita compared with the weighted median average of all remote communities of 114 GJ per capita. This provides an indication of how severe remote community energy problems could be if the standards of living and services were higher. If community standards of living are to be raised, energy planning must occur simultaneously to ensure that the total energy needs and the need for petroleum products can be reduced.

TABLE 5.3.1 - ENERGY USE SUMMARY

PROJECTED (REMOTE COMMUNITIES)

(MILLIONS OF GJ)

	10 YEAR PROJECTION				20 YEAR PROJECTION					
	Total Energy		Total Oil		Total Energy		Total Oil			
	Status Quo	With Alternatives	Status Quo	With Alternatives	Status Quo	With Alternatives	Status Quo	With Alternatives	Remote Population (Study)	Prov./Terr. Population ('81 Census)
Newfoundland	2.69	1.87	2.30	0.79	3.17	2.34	2.75	1.04	30,109	569,000
Quebec	6.89	5.32	4.89	2.59	7.61	6.03	5.61	3.25	38,330	6,482,000
Ontario	1.11	0.74	0.58	0.29	1.26	0.89	0.66	0.36	14,158	8,715,800
Manitoba	1.28	0.84	0.87	0.24	1.46	1.02	0.96	0.33	12,313	1,035,200
Saskatchewan	0.33	0.24	0.24	0.12	0.41	0.32	0.30	0.17	3,452	979,400
Alberta	0.28	0.18	0.18	0.049	0.35	0.25	0.23	0.09	3,772	2,317,000
B C	4.94	3.61	4.35	1.20	5.17	3.84	4.54	1.34	25,252	2,790,100
Yukon	7.33	6.02	2.74	0.74	7.69	6.38	2.92	0.86	22,828	23,700
NWT	11.83	9.42	8.38	4.83	13.34	10.94	9.50	5.75	46,041	47,200
Total Remote Communities	36.68	28.24	24.53	10.85	40.46	32.01	27.47	13.19	196,255	24,634,000

Status Quo means no changes to supply or use of energy except for that resulting from population increase.

With Alternatives means feasible conservation and alternative energy systems are installed.

TABLE 5.3.2 -

Projected consumption (GJ) (GJ) for Newfoundland

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Black Tickle	23950.4	14515.1	20788.4	7129.33	27345.1	17909.7	24183.1	9824.68
Cartwright	64932.3	40526.7	42569.3	9235.62	75036.0	50630.4	52673.0	17497.5
Charlottetown	19524.5	11316.9	15302.5	4329.60	22686.5	14478.9	18464.5	6579.90
Davis Inlet	18500.5	12276.1	14278.5	5611.32	21819.7	15595.3	17597.7	7972.02
Hopedale	34608.1	22274.0	31446.0	11296.0	40205.2	27871.1	37043.2	14670.6
L'Anse au Loup	55399.4	36263.0	50126.4	448.773	64879.1	45742.8	59606.1	5848.85
-Capstan Island	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-English Point	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-Forteau	48562.8	27918.9	36956.8	10175.5	56178.2	35534.2	44572.2	15519.9
-Fox Cove	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-L'Anse Amour	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-L'Anse au Clair	27202.0	19303.9	21929.0	10409.5	32273.1	24375.1	27000.1	14007.7
-L'Anse au Diable	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-Pinware	11391.1	7000.21	8229.14	2869.93	13230.2	8839.28	10068.2	4222.77
-Red Bay	30423.4	18842.4	21559.4	7569.04	35235.1	23654.1	26371.1	10994.7
-West St. Modeste	26153.5	18372.5	21511.5	10010.6	30962.8	23181.9	26320.8	13072.7
Makkovik	40842.1	28037.3	35569.1	3113.11	48995.2	36090.4	43622.2	9074.89
Mary's Harbour	37757.5	23640.0	21809.3	3107.31	44000.5	29883.0	25413.3	5992.97
-Lodge Bay	7879.87	4501.86	3274.77	0.00000	9079.27	5701.25	3772.22	0.00000
Mud Lake	6484.00	3372.48	5214.00	140.656	6484.00	3372.48	5214.00	140.656
Nain	78297.7	45341.8	65640.7	17500.8	90639.1	57683.1	77982.1	25755.7
Paradise River	25990.9	14586.6	18185.9	3759.39	29840.0	18437.7	22035.0	5879.34
Port Hope Simpson	40216.4	26069.7	20175.4	10651.0	47336.2	35189.4	27295.2	[illegible]
Postville	27262.2	19443.0	19878.2	9630.60	32638.1	24868.9	25304.1	14755.4
Rigolet	30483.3	23036.3	19937.3	10499.2	36739.0	29292.0	26193.0	16005.8
St. Lewis	25147.5	14702.6	20505.5	6165.41	29285.6	18840.7	24643.6	9266.14
William's Harbour	9833.45	5786.70	8143.45	2526.50	11467.3	7420.51	9777.26	3783.00
Croque	10767.2	6341.18	9182.19	2754.08	12613.4	8187.41	11028.4	4144.39
Harbour Deep	23009.0	16164.7	13336.0	0.00000	23009.0	16164.7	13336.0	0.00000
Main Brook	34382.0	19051.3	26472.0	0.00000	34382.0	19051.3	26472.0	0.00000
Roddickton	91749.1	64244.6	31027.9	0.00000	108216.	80711.0	36596.6	0.00000
-Bide Arm	23741.3	13711.8	13605.8	591.931	27463.2	17433.7	15738.3	2190.69
-Conche	35358.8	25626.7	27076.5	0.00000	41647.0	31914.9	31891.8	0.00000
-Englee	80696.6	54523.8	49847.8	4989.29	94530.5	68357.6	58393.2	10837.4
Saint Anthony	473383.	366033.	463184.	295821.	563979.	456629.	553780.	362172.
-Boat Harbour	10890.0	6718.04	9660.01	2690.58	12563.5	8391.50	11333.5	3445.02
-Cape Onion - Ship Cove	15430.0	9836.34	13845.0	4611.13	17883.5	12289.9	16298.5	5891.40
-Cook's Harbour	42279.6	34102.4	39464.6	26226.2	50075.6	41898.4	47260.6	31380.7
-Goose Cove East	23429.6	17947.2	22547.6	12981.7	27525.4	22042.9	26643.4	15413.2
-Great Brehat	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-Hay Cove et al	18672.4	11101.6	16386.4	3599.30	21379.3	13808.5	19093.3	4557.89
-Raleigh	23480.7	19294.1	21370.7	13906.2	28154.4	23967.8	26044.4	16232.3
-St. Anthony Bight	22398.7	14592.8	20464.7	7450.49	26071.4	18265.5	24137.4	9512.88
-St. Carrol's	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-St. Lunaire - Grandois	69632.3	55530.6	59082.4	38372.0	82784.0	68682.3	72234.0	47107.4
-Wild Bight	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
St. Julian's - Grandois	8705.39	5077.37	7298.39	2071.88	10145.3	6517.28	8738.30	3082.64
Change Islands	56810.2	39069.8	44856.2	0.00000	66663.3	48922.9	54709.3	0.00000
Fogo	94386.7	64161.1	91749.7	0.00000	110804.	80578.6	108167.	0.00000
-Deep Bay	9948.93	5671.02	9244.93	0.00000	11489.9	7212.03	10785.9	0.00000
-Island Harbour	18232.4	10604.9	17350.4	0.00000	21198.1	13570.5	20316.1	0.00000
-Joe Batt's Arm et al	92905.1	70187.7	88513.1	0.00000	110986.	88268.5	106594.	0.00000
-Seldom	46264.5	31649.4	44331.5	0.00000	54819.1	40204.0	52886.1	0.00000
-Stag Harbour	23042.2	13273.6	21635.2	0.00000	26758.1	16989.5	25351.1	0.00000
-Tilting	34024.9	27804.5	30506.9	0.00000	41121.7	34901.2	37603.7	0.00000

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Little Bay Islands	42695.4	30418.9	36540.4	17067.1	50590.4	38313.9	44435.4	21912.9
St. Brendan's	31277.3	24996.8	29870.3	18396.8	37534.2	31253.7	36127.2	21600.6
-Dock Cove	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-Hayward's Cove	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-Shalloway Cove	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Westport	32750.6	22659.7	21257.9	558.769	38879.1	28788.2	25235.8	3495.65
-Purbeck's Cove	4564.88	2625.25	3543.26	0.00000	5302.20	3362.57	4115.56	0.00000
Burgeo	251807.	178246.	245474.	106768.	301332.	227770.	294999.	138739.
Francois	19979.6	11768.6	19275.6	3586.52	23368.7	15157.6	22664.7	5806.01
Grand Bruit	8417.42	5009.63	8134.42	2329.22	9885.73	6477.94	9602.73	3389.95
Grey River	16469.8	9568.61	15628.8	3608.05	19185.5	12284.2	18344.5	5164.99
La Poile	13335.9	7742.76	12519.2	0.00000	15510.4	9917.22	14560.5	0.00000
McCallum	15610.0	9160.07	14906.0	3799.36	18236.0	11786.1	17532.0	5459.71
Monkstown	10851.3	6450.54	10430.3	1871.33	12753.2	8352.43	12332.2	3215.43
Petites	10306.4	6120.92	9885.35	2765.39	12073.6	7888.15	11652.6	3953.29
Petit Forte	9519.51	5671.65	9236.51	2739.17	11178.2	7330.34	10895.2	3947.30
Ramea	129109.	87767.1	127702.	55679.1	152663.	111321.	151256.	70661.7
Rencontre East	17583.9	11151.4	16879.9	5858.56	20546.5	14114.1	19842.5	7773.01
South East Bight	9022.78	5288.53	8601.78	2133.01	10555.3	6821.10	10134.3	3086.23
Total	.2698E7	.1866E7	.2305E7	789405.	.3172E7	.2340E7	.2754E7	.1042E7

Note: S.Q. = With Status Quo ; Alt. = With Alternatives

TABLE 5.3.3 -

Projected consumption (GJ) for Quebec

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Akulivik (Cape Smith)	26836.2	21570.5	26836.2	19470.5	31697.3	26431.6	31697.3	24331.6
Asbestos Hill	320500.	208182.	320500.	208182.	320500.	208182.	320500.	208182.
Aupaluk	12339.1	9259.18	12339.1	7859.18	13454.8	10374.9	13454.8	8974.90
Inukjuak (Port Harrison)	93673.1	75414.1	93673.1	67914.1	114855.	96595.5	114855.	89095.5
Ivujivik (C. Wolstenholme)	24852.8	19934.8	24852.8	17884.8	30868.9	25950.9	30868.9	23900.9
Kangiksuk (Payne Bay)	35393.7	27982.6	35393.7	24682.6	45004.4	37593.3	45004.4	34293.3
Kangiqsualujjuaq(George R)	38025.4	30181.1	38025.4	26781.1	48105.3	40261.0	48105.3	36861.0
Kangiqsujuaq (Maricourt)	41829.0	33897.8	41829.0	30597.9	53187.0	45255.9	53187.0	41955.9
Killinik	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Kuujjuak (Fort Chimo)	206166.	163677.	206166.	145277.	257752.	215263.	257752.	196363.
Kuujjuaraapik (P. Baleine)	211033.	172326.	211033.	157126.	261300.	222593.	261300.	207393.
Povungnituk	93672.3	76712.4	93672.3	70112.4	115984.	99024.5	115984.	92424.5
Quaqtaq	27359.1	21523.2	27359.1	18923.2	34091.5	28255.6	34091.5	25655.6
Salluit	56341.0	46185.3	56341.0	42185.3	69979.5	59823.7	69979.5	55823.7
Tasiujak (Leaf Bay)	15961.5	12738.6	15961.5	11338.6	20349.1	17126.1	20349.1	15726.1
Uumaruk	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Belleterre	12200.0	5956.47	12200.0	0.00000	12200.0	5956.47	12200.0	0.00000
Clova	14990.0	10226.7	14990.0	10226.7	14990.0	10226.7	14990.0	10226.7
Eastmain	31193.4	21605.5	31193.4	16605.5	37051.4	27463.4	37051.4	22463.4
Fort Rupert	77841.4	58950.9	77841.4	50150.9	92296.7	73406.2	92296.7	64606.2
Gagnon	.2147E7	.1932E7	147000.	132300.	.2147E7	.1932E7	147000.	132300.
Kawawchikamach	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Lac Rapide	25077.6	17528.0	25077.6	13628.0	30093.2	22543.6	30093.2	18643.6
Obedjiwan	32823.5	24344.6	32823.5	20244.6	39388.2	30909.3	39388.2	26809.3
Parent	72100.0	47877.5	72100.0	47877.5	72100.0	47877.5	72100.0	47877.5
Schefferville	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Selbaie	494550.	302751.	494550.	302751.	494550.	302751.	494550.	302751.
Wemindji	54600.0	39387.6	54600.0	32387.6	54600.0	39387.6	54600.0	32387.6
Weymontachie	27139.6	19650.5	27139.6	15950.5	31823.6	24334.5	31823.6	20634.5
Anticosti	103600.	78340.5	103600.	0.00000	103600.	78340.5	103600.	0.00000
La Romaine	86102.3	65769.2	86102.3	0.00000	132273.	111940.	132273.	43139.8
La Tabatiere	49500.0	31763.5	49500.0	0.00000	49500.0	31763.5	49500.0	0.00000
-Aylmer Sound	4157.00	2291.98	4157.00	0.00000	4157.00	2291.98	4157.00	0.00000
-Chevery	20500.0	11271.2	20500.0	0.00000	20500.0	11271.2	20500.0	0.00000
-Harrington Harbour	39800.0	28722.4	39800.0	0.00000	39800.0	28722.4	39800.0	0.00000
-Mutton Bay	14800.0	8118.72	14800.0	0.00000	14800.0	8118.72	14800.0	0.00000
-Tete a la Baleine	39580.4	26015.5	39580.4	0.00000	45370.7	31805.9	45370.7	0.00000
Lourdes de Blanc Sablon	106324.	70747.5	106324.	0.00000	120388.	84811.9	120388.	0.00000
-Blanc Sablon	119752.	99397.2	119752.	0.00000	131220.	110866.	131220.	0.00000
-Bradore Bay	11323.2	6532.31	11323.2	0.00000	11986.4	7195.50	11986.4	0.00000
-Middle Bay	6560.00	3614.89	6560.00	0.00000	6560.00	3614.89	6560.00	0.00000
-Old Fort Bay	16740.6	10035.8	16740.6	0.00000	18864.5	12159.6	18864.5	0.00000
-St. Paul's River	33336.8	19927.1	33336.8	0.00000	37417.6	24008.0	37417.6	0.00000
St. Augustin	89924.7	62904.6	89924.7	0.00000	117218.	90197.7	117218.	6197.74
Cap-aux-Meules	243934.	169257.	243934.	130407.	289262.	214586.	289262.	175736.
-Etang du Nord	438754.	307790.	438754.	240390.	519452.	388489.	519452.	321089.
-Fatima	409879.	293514.	409879.	234914.	483367.	367002.	483367.	308402.
-Grand Entree	123049.	87142.5	123049.	68842.5	145078.	109171.	145078.	90871.4
-Grosse Ile	58644.7	43323.4	58644.7	35923.4	69254.1	53932.8	69254.1	46532.8
-Havre aux Maison	305738.	218523.	305738.	174523.	360643.	273428.	360643.	229428.
-Havre Aubert	356881.	256530.	356881.	206230.	420554.	320202.	420554.	269902.
Iles d'Entree	20911.9	14780.4	20911.9	11680.4	24853.7	18722.2	24853.7	15622.2
Total	.6893E7	.5316E7	.4893E7	.2593E7	.7609E7	.6033E7	.5609E7	.3247E7

Note: S.Q. = Status Quo : Alt. = With Alternatives

TABLE 5.3.4 - Projected consumption (GJ) for Ontario

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Attawapiskat	66364.2	42739.3	34017.9	17270.5	75696.7	52071.8	38801.6	22054.3
Fort Albany	71407.1	45179.3	45125.6	20495.5	81448.7	55220.9	51471.4	26841.3
Fort Severn	33461.1	20374.5	13771.1	8204.39	38166.5	25080.0	18476.5	12909.9
Kashechewan	41543.2	28283.1	15261.7	10814.7	47385.2	34125.1	17407.9	12960.9
Winisk	20790.2	13170.9	12842.2	7490.39	23713.8	16094.5	15765.8	10414.0
Allan Water	3903.25	2496.30	1679.44	1112.18	4452.14	3045.19	1915.61	1348.35
Armstrong	119815.	97784.2	113750.	89980.2	136664.	114633.	129746.	105976.
Auden	10187.3	7555.47	6750.49	3761.23	11619.9	8988.06	7699.78	4526.60
Biscotasing	6267.11	3683.95	5721.60	0.00000	7148.42	4565.26	6526.20	0.00000
Collins	7807.62	4832.67	2955.67	1876.61	8905.57	5930.62	3371.31	2292.25
Ferland	5651.58	3277.48	1608.28	959.020	6446.33	4072.23	1834.45	1185.18
Graham	8756.33	5477.93	6330.35	3873.15	9987.69	6709.29	7220.56	4763.36
Hillsport	10784.8	7288.27	8156.61	5349.62	12301.4	8804.87	9303.64	6496.64
Moose River Crossing	10176.0	6143.94	2089.41	659.885	11607.0	7574.94	2383.23	897.961
Oba	17511.5	11871.9	14175.2	0.00000	19974.1	14334.5	16168.6	0.00000
Ramsey	28251.1	16574.3	27846.8	3433.96	32223.9	20547.1	31762.7	6019.13
Sultan	24492.4	15121.2	18730.2	3553.96	27936.7	18565.5	21364.1	5308.33
Angling Lake(Wapekaka)	11441.5	7472.56	3354.92	2589.89	13050.5	9081.52	3826.70	3061.68
Bearskin Lake	22224.6	15539.6	9286.02	6988.56	25349.9	18664.9	10591.9	8294.41
Big Trout Lake	71211.7	45665.4	28757.1	20162.4	81225.8	55679.5	32801.0	24206.3
Cat Lake	19965.7	13923.0	8240.19	6330.01	22773.4	16730.7	9398.96	7488.79
Deer Lake	26119.9	17763.3	9542.40	0.00000	29793.0	21436.4	10884.3	0.00000
Fort Hope	35881.4	22376.4	13804.8	7029.16	40927.2	27422.2	15746.1	8802.91
Gull Bay	19542.2	13172.9	8423.15	6600.55	22290.3	15921.1	9607.66	7785.06
Kasabonika	21571.8	14502.4	7420.24	4799.09	24605.3	17535.9	8463.71	5842.56
Kingfisher	16629.5	11452.4	6521.22	4522.74	18968.0	13790.9	7438.27	5439.78
Lac Seul	24546.6	14634.1	3319.34	2515.04	27998.5	18086.0	3786.12	2981.83
Lansdowne House	21738.9	14517.6	12843.7	8544.98	24796.0	17574.7	14649.8	10351.1
Long Dog Lake	1046.96	585.735	36.1412	32.9412	1194.19	732.965	41.2235	38.0235
MacDowell	2359.34	1487.09	539.859	492.059	2691.12	1818.87	615.776	567.976
Muskrat Dam	10886.4	7416.50	4012.80	0.00000	12417.3	8947.40	4577.10	0.00000
North Spirit Lake	15573.5	10730.4	6071.72	4825.57	17763.5	12920.4	6925.55	5679.41
Ogoki/Marten Falls	10703.4	8207.91	6457.98	5026.31	12208.6	9713.08	7366.13	5934.47
Pikangikum	55203.4	33655.5	18813.7	0.00000	62966.4	41418.5	21459.4	0.00000
Ponask	3086.68	2223.74	1469.36	1012.19	3520.75	2657.80	1675.99	1218.82
Poplar Hill	11476.0	7806.44	4198.02	0.00000	13089.8	9420.25	4788.37	0.00000
Sachigo	16679.2	11295.9	5964.42	3974.97	19024.7	13641.4	6803.17	4813.71
Sandy Lake	91354.7	57740.6	43239.5	0.00000	104201.	70587.4	49320.1	0.00000
Slate Falls/Fry Lake	6171.11	3819.12	1218.64	1086.36	7038.92	4686.93	1390.01	1257.73
Summer Beaver	15033.6	8699.51	4379.86	2786.69	17147.7	10813.6	4995.78	3402.60
Weagamow(Caribou Lake)	39829.8	26113.7	20017.7	12829.9	45430.9	31714.8	22832.7	15644.9
Webequie	30167.7	19637.9	13185.9	8448.00	34410.1	23880.3	15040.1	10302.3
Wunnummin Lake	20523.7	13304.9	5760.00	0.00000	23409.8	16191.1	6570.00	0.00000
Total	.1108E7	735599.	577691.	289433.	.1264E7	891431.	662816.	357109.

Note: S.Q. = With Status Quo ; Alt. = With Alternatives

TABLE 5.3.5 -

Projected consumption for Alberta

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Fort Chipewyan	139656.	89747.7	106090.	25886.1	175122.	125213.	133031.	45915.7
Jean d'Or Prairie	37696.0	24791.5	22724.7	2342.62	46993.7	34089.2	28329.8	7842.60
Fox Lake	46883.6	30733.6	29334.2	4455.73	58514.2	42364.1	36611.3	11669.2
Trout Lake AB	19890.0	12490.8	9772.26	6163.69	25101.5	17702.3	12332.7	8724.17
Peerless Lake	20540.2	13045.0	10520.6	6815.93	25696.7	18201.4	13161.7	9457.05
Chipewyan Lake	12494.0	7600.44	4456.92	2563.77	15582.2	10688.6	5558.55	3640.52
Peace Point	3118.82	2322.35	1134.12	952.388	4141.18	3344.71	1505.88	1324.15
Garden Creek	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Total	280279.	180731.	184032.	49180.2	351151.	251604.	230531.	88573.4

Note: S.Q. = With Status Quo ; Alt. = With Alternatives

Projected consumption for Saskatchewan

Projected Consumption (GJ) for : Saskatchewan

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Black Lake	41343.3	29693.8	25519.6	6752.05	51404.6	39755.1	31730.1	12962.5
Brabant	11554.0	8274.00	7517.13	5003.47	14873.1	11593.1	9676.55	7137.02
Camsell Portage	10743.9	8098.33	8594.65	5098.37	13696.5	11050.9	10956.6	7237.33
Deschambault	40807.1	29688.0	31047.6	20570.7	51716.7	40597.6	39348.0	28552.0
Fond du Lac	68821.1	54910.9	56116.9	32920.4	84743.2	70833.0	69099.8	45854.5
Garson Lake	5886.00	4247.50	1950.00	1787.50	7242.09	5603.59	2399.26	2236.76
Kinoosao	7874.00	5179.13	5578.00	2556.29	7874.00	5179.13	5578.00	2556.29
Southend	36817.2	27268.0	29369.9	7246.43	46803.5	37254.3	37336.2	14632.1
Stony Rapids	56257.4	42186.2	44451.2	13257.2	67298.3	53227.1	53175.1	21038.4
Wollaston	45512.4	32873.1	33560.1	19905.2	59718.9	47079.6	44035.8	29527.9
Total	325616.	242419.	243705.	115098.	405371.	322174.	303335.	171735.

Note: S.Q. = With Status Quo ; Alt. = With Alternatives

Projected consumption (GJ) for Manitoba

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Brochet	50773.3	33727.1	29450.6	0.00000	58370.4	41324.2	33857.3	0.00000
Garden Hill	149678.	94308.9	76739.6	0.00000	168077.	112709.	86173.0	0.00000
God's Lake Narrows	98047.8	64501.9	50374.7	0.00000	117752.	84206.1	60498.3	0.00000
God's River	23701.3	14861.7	11315.7	0.00000	27233.0	18393.4	13001.8	0.00000
Granville Lake	7498.06	5390.26	3514.76	0.00000	10223.6	8115.85	4792.39	0.00000
Lac Brochet	17394.8	11659.2	10237.8	0.00000	19936.2	14200.6	11733.5	0.00000
Oxford House	106058.	70680.7	48137.8	0.00000	134942.	99565.4	61248.1	0.00000
Pikwitonei	24977.2	16318.3	13197.6	1991.88	28822.6	20163.7	15229.4	4023.69
Pukatawagan	56573.8	36537.5	31562.0	0.00000	67060.6	47024.4	37412.5	0.00000
Red Sucker Lake	37598.7	26236.5	18567.1	0.00000	52953.2	41591.1	26149.5	0.00000
St. Theresa Point	109155.	70953.8	53752.6	0.00000	130908.	92706.5	64464.5	0.00000
Shamattawa	47185.8	32329.3	21255.8	14336.2	63667.5	48811.1	28680.4	21760.3
Tadoule Lake	16689.5	10765.0	7495.71	0.00000	19150.7	13226.3	8601.12	0.00000
Thicket Portage	22103.0	13867.8	12465.0	7519.50	22103.0	13867.8	12465.0	7519.50
Waasagomach	68068.2	48114.5	38332.0	0.00000	94653.2	74699.5	53303.1	0.00000
Churchill	444058.	290012.	444058.	0.00000	444058.	290012.	444058.	0.00000
Total	.1280E7	840264.	870457.	23847.6	.1460E7	.1021E7	961668.	33304.0

Note: S.Q. = With Status Quo ; Alt. = With Alternatives

TABLE 5.3.6 -

Projected consumption (GJ) for B.C.

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
ACTEON SOUND	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
ANAHIM LAKE	85389.0	58124.2	64012.0	38247.9	85389.0	58124.2	64012.0	38247.9
ATLIN	159529.	115658.	74506.0	0.00000	159529.	115658.	74506.0	0.00000
BAKER MINE CAMP	183150.	143163.	183150.	142833.	183150.	143163.	183150.	142833.
BAMFIELD	75825.0	66340.2	75368.0	50805.6	75825.0	66340.2	75368.0	50805.6
BARCLAY DIV.(KILDONAN)	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
BARR CREEK	197.000	177.300	197.000	0.00000	197.000	177.300	197.000	0.00000
BELLA BELLA	208857.	142129.	172033.	0.00000	243371.	176642.	200462.	0.00000
BELLA COOLA	337147.	247788.	284150.	0.00000	337147.	247788.	284150.	0.00000
BIG BAR/JESMOND CREEK AREA	13655.9	12167.5	8148.70	0.00000	16408.3	14919.9	9791.08	0.00000
BOB QUINN LAKE	24460.0	21309.5	24460.0	21036.9	24460.0	21309.5	24460.0	21036.9
BOULDER BAY	6643.00	5111.52	4537.00	0.00000	6643.00	5111.52	4537.00	0.00000
CASSIAR	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
CHRISTIAN VALLEY	3647.23	2481.64	1605.56	0.00000	4201.79	3036.19	1849.68	0.00000
CLEAGH CREEK	26625.0	18680.1	26625.0	7343.30	26625.0	18680.1	26625.0	7343.30
DEASE LAKE	133360.	103964.	118217.	67170.8	158078.	128681.	140127.	85651.5
DOME CREEK / CRESCENT SPUR	43808.2	38417.8	21147.6	0.00000	52637.7	47247.3	25409.9	0.00000
DRURY INLET	26629.0	18683.7	26629.0	7346.90	26629.0	18683.7	26629.0	7346.90
EARLS CREEK	190.000	171.000	190.000	0.00000	190.000	171.000	190.000	0.00000
EASTGATE	23822.9	20527.3	17856.2	0.00000	28771.0	25475.4	21565.0	0.00000
ERICKSON GOLD MINE VILLAGE	100358.	56866.1	100358.	56866.1	100358.	56866.1	100358.	56866.1
FIELD	52392.0	32782.8	39811.0	0.00000	52392.0	32782.8	39811.0	0.00000
FORT BABINE IR #6	14737.6	9252.86	3019.02	1253.94	16808.8	11324.1	3443.31	1626.40
FORT WARE	12210.0	6692.66	353.000	0.00000	12210.0	6692.66	353.000	0.00000
GERMANSEN LANDING	1824.00	1641.60	1824.00	1641.60	1824.00	1641.60	1824.00	1641.60
GILFORD ISLAND	2626.00	1913.59	1325.00	505.310	2626.00	1913.59	1325.00	505.310
GOOD HOPE LAKE - HIGHWAYS	22335.0	16505.9	22335.0	16531.1	22335.0	16505.9	22335.0	16531.1
GREENWOOD CAMP	6446.00	4033.70	6446.00	0.00000	6446.00	4033.70	6446.00	0.00000
HARTLEY BAY	38669.3	26403.0	32594.3	12428.5	45101.0	32834.8	38015.6	16939.0
HESQUIAHT	8780.60	5467.25	3954.31	0.00000	10101.4	6788.05	4549.12	0.00000
HOLBERG	95215.0	69017.3	94364.0	0.00000	95215.0	69017.3	94364.0	0.00000
HOLBERG DND	77197.0	43051.9	77197.0	0.00000	77197.0	43051.9	77197.0	0.00000
HORNET	282.000	253.800	282.000	0.00000	282.000	253.800	282.000	0.00000
ISKUT/EDDONTENAJON	88055.0	64496.4	61630.0	44047.2	88055.0	64496.4	61630.0	44047.2
JUSKATLA	40388.0	30023.7	40101.0	0.00000	40388.0	30023.7	40101.0	0.00000
KILBELLA BAY	12141.0	8686.50	12141.0	0.00000	12141.0	8686.50	12141.0	0.00000
KINGCOME INLET	25505.0	21634.8	21135.7	12189.4	29280.9	25410.7	24264.7	15264.2
KINGCOME INLET (WHONNOCK)	27717.0	19649.3	27717.0	8308.80	27717.0	19649.3	27717.0	8308.80
KITKATLA	41298.9	27413.1	38715.9	14943.4	48307.0	34421.2	45724.0	19397.7
KLEMTU	75731.6	66014.3	70540.7	21695.8	88212.3	78495.0	82166.0	32522.8
KNIGHT INLET	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
KYUQUOT	14423.0	7921.35	1424.00	0.00000	14423.0	7921.35	1424.00	0.00000
LASQUETI ISLAND	19989.0	14689.1	1154.82	652.362	23299.3	17999.3	1346.07	817.029
LONGWORTH	732.000	658.800	732.000	0.00000	732.000	658.800	732.000	0.00000
LOWER POST	3249.00	2924.10	3249.00	2924.10	3249.00	2924.10	3249.00	2924.10
MACHMELL	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
MAHATTA RIVER	50424.0	36569.1	50184.0	33996.9	50424.0	36569.1	50184.0	33996.9
MANNING PROVINCIAL PARK	65554.0	44126.4	65554.0	0.00000	65554.0	44126.4	65554.0	0.00000
MASSET	514661.	352278.	476375.	0.00000	514661.	352278.	476375.	0.00000
MCNAB CAMP	9167.00	6628.70	9167.00	971.871	9167.00	6628.70	9167.00	971.871
MEZIADIN LAKE - HIGHWAYS	21744.0	16024.3	21744.0	15954.7	21744.0	16024.3	21744.0	15954.7
MOOYA BAY (NOOTKA)	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
MOSES INLET	4829.00	2815.52	4829.00	0.00000	4829.00	2815.52	4829.00	0.00000

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
NARROWS INLET LOGGING DIV.	11279.0	7698.77	11279.0	0.00000	11279.0	7698.77	11279.0	0.00000
NAZKO INDIAN BAND	12362.0	6827.80	1283.00	0.00000	12362.0	6827.80	1283.00	0.00000
NEMAIAH VALLEY INDIAN BAND	12020.3	7418.56	1545.04	0.00000	13648.1	9046.31	1754.26	0.00000
NICKNAQUEET	352.000	316.800	352.000	0.00000	352.000	316.800	352.000	0.00000
NITINAHT	12463.6	8728.84	8242.64	0.00000	14264.3	10529.5	9433.49	0.00000
NUCHATLAHT	1609.00	942.041	354.000	0.00000	1609.00	942.041	354.000	0.00000
OWIKENO	8782.00	6914.74	7581.00	4358.29	8782.00	6914.74	7581.00	4358.29
PENNY	1070.00	963.000	1070.00	0.00000	1070.00	963.000	1070.00	0.00000
PHILLIPS ARM	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
PITT LAKE	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
PORT DOUGLAS (HARRISON)	11793.0	8095.48	11793.0	2591.89	11793.0	8095.48	11793.0	2591.89
PORTAGE (NANCUT)	8262.00	4879.18	1282.00	564.120	8262.00	4879.18	1282.00	564.120
PROPHET RIVER	10982.2	8568.14	6078.76	4427.32	12918.2	10504.2	7150.38	5498.95
QUATAM RIVER	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
SANDSPIT	407608.	269136.	379145.	60420.8	407608.	269136.	379145.	60420.8
SAVARY ISLAND	252.000	226.800	252.000	226.800	252.000	226.800	252.000	226.800
SCOTT COVE	27234.0	19228.2	27234.0	7891.40	27234.0	19228.2	27234.0	7891.40
SCOTTY GOLD	939.000	845.100	939.000	0.00000	939.000	845.100	939.000	0.00000
SECHELL CREEK	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
SEWELL INLET	48608.0	35342.5	48255.0	20496.2	48608.0	35342.5	48255.0	20496.2
SEYMOUR ARM	43509.6	28218.9	7533.05	0.00000	49864.9	34574.2	8633.38	0.00000
SEYMOUR INLET	27233.0	19227.3	27233.0	7890.50	27233.0	19227.3	27233.0	7890.50
SHEEMAHANT	10176.0	6861.37	10176.0	4908.84	10176.0	6861.37	10176.0	4908.84
SHOTBOLT	352.000	316.800	352.000	0.00000	352.000	316.800	352.000	0.00000
SIMOON SOUND	285.741	260.441	285.741	260.441	324.435	299.135	324.435	299.135
STAVE LAKE	5013.00	4226.76	5013.00	0.00000	5013.00	4226.76	5013.00	0.00000
STEWART	305785.	198659.	285607.	0.00000	305785.	198659.	285607.	0.00000
TAKLA	19628.0	11744.6	1847.72	1105.59	22286.0	14402.5	2097.93	1355.80
TATLA LAKE	31417.3	20858.7	24409.0	9119.96	36102.3	25543.8	28048.9	12707.9
TELEGRAPH CREEK	39418.0	30065.0	21782.0	0.00000	39418.0	30065.0	21782.0	0.00000
TIDE LAKE	1455.00	1309.50	1455.00	0.00000	1455.00	1309.50	1455.00	0.00000
TIMFOR	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
TOAD RIVER AREA	11284.0	6907.56	3872.75	44.6742	12812.0	8435.59	4397.19	318.286
TOM BROWN LAKE	11740.0	8069.61	11740.0	0.00000	11740.0	8069.61	11740.0	0.00000
TROUT LAKE BC	16120.0	13230.6	7920.00	0.00000	16120.0	13230.6	7920.00	0.00000
VERNON	65948.0	44949.9	65948.0	0.00000	65948.0	44949.9	65948.0	0.00000
WAKEMAN SOUND	12200.0	8440.37	12200.0	0.00000	12200.0	8440.37	12200.0	0.00000
WESTERN MINES (MYRA FALLS)	707430.	628344.	707430.	493625.	803227.	724142.	803227.	589372.
WOSS	141673.	96358.6	141673.	0.00000	141673.	96358.6	141673.	0.00000
Total	.4945E7	.3606E7	.4354E7	.1198E7	.5174E7	.3835E7	.4546E7	.1340E7

Note: S.Q. = With Status Quo ; Alt. = With Alternatives

TABLE 5.3.7 -

Projected consumption (GJ) for Yukon

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Dawson City	252687.	169127.	234880.	79882.1	271399.	187839.	252274.	93612.3
Watson Lake	251781.	160269.	229334.	62604.6	270863.	179351.	246714.	76031.9
Whitehorse	.3564E7	.2923E7	.1536E7	179395.	.3847E7	.3205E7	.1658E7	261423.
Faro	.2083E7	.1840E7	287650.	207575.	.2083E7	.1840E7	287650.	207575.
Mayo	100948.	80724.6	40108.0	21541.2	100948.	80724.6	40108.0	21541.2
Elsa	518078.	459550.	139685.	112276.	518078.	459550.	139685.	112276.
Keno	11159.0	7395.45	4274.00	1624.81	11159.0	7395.45	4274.00	1624.81
Beaver Creek	30917.0	20621.7	30117.0	12562.1	30917.0	20621.7	30117.0	12562.1
Burwash Landing	12562.1	7750.18	7148.77	0.00000	14511.3	9699.44	8258.04	0.00000
Destruction Bay	30842.0	22599.1	29205.0	16607.3	30842.0	22599.1	29205.0	16607.3
Carcross	41789.6	29701.9	13236.7	0.00000	44936.8	32849.1	14233.6	0.00000
Carmacks	62784.4	47364.1	20420.0	1550.73	67451.6	52031.4	21937.9	2509.78
Haines Junction	97639.8	78336.8	39147.5	11738.4	104992.	85688.9	42095.2	13902.5
Johnsons Crossing	3501.00	1939.83	2073.00	1140.55	3501.00	1939.83	2073.00	1140.55
Old Crow	34727.4	22849.0	18077.8	9698.06	39955.6	28077.2	20799.5	12237.7
Pelly Crossing	25423.1	16459.1	17086.8	9065.48	29399.8	20435.9	19759.6	11562.6
Ross River	61913.9	44396.8	19602.1	1366.90	66493.0	48975.9	21051.9	2292.04
Stewart Crossing	9205.00	5794.50	9205.00	4269.79	9205.00	5794.50	9205.00	4269.79
Swift River	9151.00	6035.22	9151.00	4016.40	9151.00	6035.22	9151.00	4016.40
Tagish & Marsh Lake	43916.5	26375.2	8511.77	0.00000	47085.0	29543.8	9125.89	0.00000
Teslin	60201.8	38068.0	44161.7	0.00000	64611.5	42477.7	47396.5	0.00000
Upper Liard	23062.9	13578.6	5963.34	3558.94	26495.5	17011.3	6850.92	4446.52
Total	.7330E7	.6022E7	.2745E7	740474.	.7692E7	.6384E7	.2920E7	859633.

Note: S.Q. = With Status Quo ; Alt. = With Alternatives

Projected Consumption (GJ) for : NWT

Projected consumption (GJ) for NWT

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Arctic Bay	42724.0	26412.3	42724.0	15801.1	42724.0	26412.3	42724.0	15801.1
Broughton Island	57576.9	38701.5	57576.9	27315.0	63006.5	44131.1	63006.5	30575.8
Cape Dorset	110998.	79450.5	110998.	54710.8	128996.	97448.5	128996.	67394.4
Clyde River	60714.6	43883.4	60714.6	31636.3	83076.1	66244.8	83076.1	46343.4
Frobisher Bay	413050.	252910.	413050.	208924.	413050.	252910.	413050.	208924.
Grise Fiord	21111.0	13992.2	21111.0	11612.2	21111.0	13992.2	21111.0	11612.2
Hall Beach	47331.4	33493.2	47331.4	21040.9	62351.4	48513.3	62351.4	30823.2
Igloolik	108900.	76633.8	108900.	52114.8	125075.	92808.4	125075.	63161.7
Lake Harbour	100739.	87831.1	100739.	83588.4	112120.	99211.5	112120.	93915.1
Nanisivik	185626.	140226.	185626.	113389.	185626.	140226.	185626.	113389.
Pangnirtung	104106.	74505.0	104106.	59326.8	124563.	94962.1	124563.	74191.9
Pond Inlet	121227.	90301.5	121227.	69418.7	163357.	132432.	163357.	99367.4
Resolute	116394.	68209.7	116394.	40517.2	116394.	68209.7	116394.	40517.2
Sanikiluaq	45790.3	13352.9	45790.3	1588.10	65976.2	33538.8	65976.2	15851.5
Baker Lake	131818.	88128.5	131818.	55358.1	153067.	109377.	153067.	70147.0

Community Name	In the year 1992				In the year 2002			
	Total Energy (GJ)		Total Oil (GJ)		Total Energy (GJ)		Total Oil (GJ)	
	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.	S.Q.	Alt.
Chesterfield Inlet	43907.1	30719.3	43907.1	22070.1	47077.6	33889.8	47077.6	24372.2
Coral Harbour	56208.7	35827.7	56208.7	22749.8	60834.3	40453.3	60834.3	26478.7
Eskimo Point	128677.	91430.8	128677.	57871.4	168882.	131636.	168882.	83845.7
Rankin Inlet	253693.	190915.	253693.	136038.	363100.	300321.	363100.	219630.
Repulse Bay	57742.8	42713.7	57742.8	28559.5	82803.1	67773.9	82803.1	46451.5
Whale Cove	30338.3	19759.1	30338.3	12767.6	32585.0	22205.9	32585.0	14289.6
Bathurst Inlet	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Cambridge Bay	205314.	161558.	205314.	135730.	255312.	211556.	255312.	180054.
Coppermine	90562.2	62128.4	90562.2	0.00000	101456.	73022.0	101456.	0.00000
Gjoa Haven	64607.9	47678.5	64607.9	37127.5	84685.3	67755.9	84685.3	51449.9
Holman	31888.9	21949.1	31888.9	14566.3	38573.6	28633.9	38573.6	19553.2
Pelly Bay	34802.0	23789.1	34802.0	19791.7	34802.0	23789.1	34802.0	19791.7
Spence Bay	68217.0	45280.1	68217.0	36262.4	68217.0	45280.1	68217.0	36262.4
Aklavik	94556.0	63421.6	94556.0	52497.4	94556.0	63421.6	94556.0	52497.4
Arctic Red River	9678.00	6181.24	8718.00	3158.38	9678.00	6181.24	8718.00	3158.38
Colville Lake	3704.00	1910.54	248.000	127.920	3704.00	1910.54	248.000	127.920
Fort Franklin	56167.1	40212.5	51943.1	30115.6	73951.2	57996.6	69727.2	43971.5
Fort Good Hope	51050.3	32993.9	38954.3	21505.8	54749.0	36692.6	42653.0	24672.3
Fort McPherson	101259.	67316.4	91275.0	26893.6	101259.	67316.4	91275.0	26893.6
Fort Norman	46576.1	31470.7	41944.0	11579.8	54255.9	39150.5	48860.0	16722.4
Inuvik	516916.	351612.	515572.	319119.	516916.	351612.	515572.	319119.
Norman Wells	763529.	676872.	763529.	675768.	865051.	778394.	865051.	776984.
Paulatuk	22350.6	16032.7	22350.6	11768.7	32526.1	26208.2	32526.1	18992.2
Sachs Harbour	26014.0	16548.5	26014.0	10978.5	26014.0	16548.5	26014.0	10978.5
Tuktoyaktuk	147122.	112148.	147122.	94902.7	209231.	174256.	209231.	145072.
Detah	14605.6	11652.1	10051.8	8019.16	16583.4	13630.0	11412.9	9380.34
Enterprise	4396.00	3640.16	3628.00	0.00000	4396.00	3640.16	3628.00	0.00000
Fort Liard	37428.8	26902.1	20697.9	13852.6	52982.1	42455.3	29298.8	22232.7
Fort Providence	115025.	86914.6	113390.	58998.7	123344.	95233.8	121591.	65923.5
Fort Resolution	66714.0	51409.1	59418.0	26914.6	66714.0	51409.1	59418.0	26914.6
Fort Simpson	231185.	176574.	222929.	159940.	231185.	176574.	222929.	159940.
Fort Smith	421161.	348826.	382185.	289130.	421161.	348826.	382185.	289130.
Hay River	862795.	636316.	845707.	0.00000	862795.	636316.	845707.	0.00000
Jean Marie River	6411.88	3852.45	3149.12	1852.59	6861.74	4302.31	3370.06	2073.53
Kakisa	1344.00	656.188	0.00000	0.00000	1344.00	656.188	0.00000	0.00000
Lac la Martre	17940.4	12368.8	10036.5	5327.84	24586.0	19014.3	13754.3	8658.71
Nahanni Butte	6181.00	3842.13	3877.00	2322.60	6181.00	3842.13	3877.00	2322.60
Paradise Gardens	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Pine Point	.1582E7	.1404E7	91450.0	62323.7	.1582E7	.1404E7	91450.0	62323.7
Port Radium	104922.	94429.8	104922.	94429.8	104922.	94429.8	104922.	94429.8
Rae Lakes	8775.53	5139.95	0.00000	0.00000	11282.8	7647.25	0.00000	0.00000
Rae Edzo	88249.8	77535.9	85531.3	63423.1	117783.	107069.	114155.	89485.3
Snare Lakes	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Snowdrift	25719.4	17968.8	21226.3	10593.8	30205.4	22454.9	24928.6	13842.2
Trout Lake	3838.00	1952.08	190.000	96.6377	3838.00	1952.08	190.000	96.6377
Tungsten	44806.0	40325.4	44806.0	40325.4	44806.0	40325.4	44806.0	40325.4
Wrigley	17493.0	10565.2	12309.0	5884.30	17493.0	10565.2	12309.0	5884.30
Yellowknife	.3592E7	.3091E7	.1809E7	.1362E7	.4368E7	.3866E7	.2210E7	.1717E7
Total	.1183E8	.9425E7	.8380E7	.4834E7	.1334E8	.1094E8	.9503E7	.5753E7

Note: S.Q. = With Status Quo ; Alt. = With Alternatives

6. CONCLUSIONS

6.1 THE DIVERSITY OF REMOTE COMMUNITIES

The Energy Overview of Canada's Remote Communities has provided numerous insights into the energy use at remote communities. All of the information was available previously to varying degrees through the regional overviews, but a national overview was needed to condense the data into a consistent format that could be conveniently analysed.

Remote communities are diverse in every respect. They extend from latitude 47°N to 76°N and from longitude 54°W to 140°W. Their populations range from 15 to 15,000 and the amount of heating degree days (below 18°C) range from 3,000 to nearly 13,000. The standards of living range from primitive to modern and the use of oil for heating and electrical generation increases with the degree days and the standard of living respectively. The economies of the communities range from the traditional existence based on local resources (fishing, hunting, trapping) to more modern resource development (logging, mining, tourism). A few communities have developed as supply centers for a larger area and provide a full range of services to complement the resource base. Energy use appears to increase the more modern a community becomes.

It is difficult to make strict comparisons between communities, considering the diversity of physical and economic conditions present as well as the diversity of energy supply methods in use. However, the aggregation of these figures is significant in terms of both provincial/territorial and national energy planning. By knowing the amounts of energy used in various regions relative to the amount of oil, the impact of price and supply changes can be predicted and appropriate measures taken where necessary.

6.2 IMPLEMENTATION OF CONSERVATION AND RENEWABLE ENERGY TECHNOLOGIES

The diversity of remote communities must be considered whenever the communities are analysed and compared, but there remain relatively few techniques for improving the community energy situation and these are applicable to any remote community. The following guidelines present a step by step approach to improving the energy use while lowering the use of oil.

Awareness: The first step towards energy savings comes by making individuals and organizations aware of the amount of energy they use, what its true cost is (for those that don't pay directly) and what a realistic use of energy would be for their situation.

Responsibility: Most remote communities have a variety of individuals, agencies, corporations and utilities which may look after community energy needs. To most of these organisations energy optimization is a sideline, and they may have individual perspectives in mind instead of community perspectives.

Guidelines must be established so that the use of energy in the community is optimized by all the energy consumers. This should have the added benefit of making more energy information available.

Energy Records: The database has clearly indicated that many communities lacked basic data on energy use. Improvements to energy systems cannot be made until the actual energy use is known both for space heating and electrical generation for various sectors of the community. Indications of typical house and building insulation and construction standards should also be provided.

Efficiency: Existing energy systems cannot be effectively compared with improved systems until they are first made more efficient. Diesel generators performance must be evaluated and electrical distribution systems should be checked for losses. Building insulation levels and heating systems should be optimized commensurate with the age and construction of the building and the cost/benefit of improvements.

Technology Development: Energy system information relevant to Canadian conditions must be made available so that realistic, proven comparisons can be made for system upgrading. Resource evaluation on a site specific basis must also occur to know where suitable locations for wind, small hydro, wood and peat utilization projects can succeed. The communities should then have a set of proven alternatives to evaluate.

Economic Analysis: The regional overviews have presented a complete range of analysis techniques, including first cost only, operating cost only, simple payback, life cycle cost, annual equivalent cost and some variations of the preceding. In addition, separate cost perspectives exist from the viewpoint of the individuals, utilities, agencies, corporations and both senior levels of government. The development of a consistent means of evaluating total system fixed and operating costs compared with long term costs of existing systems (diesel generation, oil heat, low insulation levels) is an important step to achieving energy optimization. Analysis must also include the optimal management of existing and alternative resources to improve cost effectiveness.

Energy Pricing: The government plays a key role in the cost of energy and some of the spin-off effects of energy costs. These include the built in taxes and royalties on oil, sales taxes on energy equipment, income transfer payments, energy subsidies, and direct payments by government agencies for oil they consume. These factors should be evaluated to examine which levels of government suffer or benefit from a re-allocation of resources, and whether subsidies or incentives are the most cost effective means to conserve energy while making it affordable to individuals.

Government's Role: In conjunction with the involvement in the price and income structure in communities, government at all levels often plays a direct role in the community as a major supplier and/or user of energy and in the territories, a provider of housing and heating systems. The government or its agencies should take direct action at their own facilities and lead by example in the remote communities. In addition, where the use of oil may be the most cost effective solution from the required point of view, the effort can be concentrated on optimizing its use through efficiency, management and conservation.

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8. FIGURES

8.1 REGIONAL MAPS

Maps are shown for the regions in the following order:

Newfoundland
Quebec
Ontario
Prairies
British Columbia
Yukon and Northwest Territories

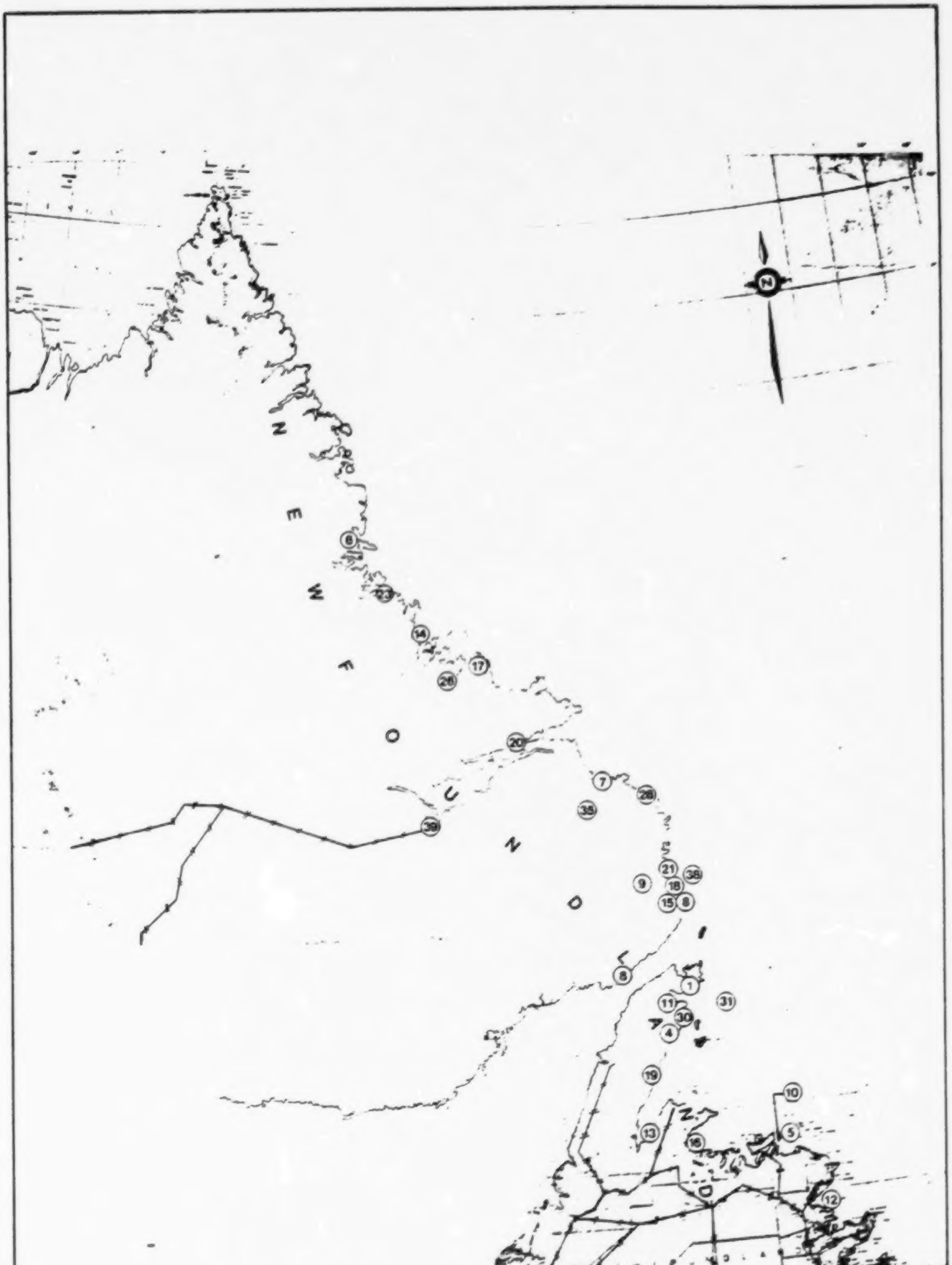
Facing each map is a list of communities. The communities are listed alphabetically with the population shown either from the 1981 census or 1982 estimates. The number beside the community corresponds to its map location, and the community numbered 1 is the largest in the province or territory, with successive numbers ranking progressively smaller communities. The numbering system has a few variations in Newfoundland where many small communities are in the same area, and are served by the same diesel grid system. Often the electricity and fuel uses are not provided for the smaller communities. A decimal numbering system is used (i.e. 8.01, 8.02 etc) indicating the rank of communities within the eighth largest grouping in Newfoundland. The numbering system is also used in the charts described in Section 8.2.

The gas and electricity lines are shown based on national mapping (References 41 and 42). Detailed lines are not shown except in the vicinity of remote communities.

NEWFOUNDLAND

	Name	Pop'n	MapNo
Labrador	Black Tickle	194	28
	Cartwright	658	7
	Charlottetown	250	21
	Davis Inlet	240	23
	Hopedale	425	14
	L'Anse au Loup	589	8
	-Capstan Island	77	8.01
	-English Point		8.02
	-Forteau	520	8.03
	-Fox Cove	247	8.04
	-L'Anse Amour		8.05
	-L'Anse au Clair	267	8.06
	-L'Anse au Diable		8.07
	-Pinware	201	8.08
	-Red Bay	316	8.09
	-West St. Modeste	273	8.1
	Makkovik	347	17
	Mary's Harbour	408	15
	-Lodge Bay	124	15.1
	Mud Lake	72	39
	Nain	938	6
	Paradise River	92	35
	Port Hope Simpson	581	9
	Postville	223	26
	Rigolet	271	20
	St. Lewis	280	18
	William's Harbour	78	38
Northern Newfoundland	Croque	147	30
	Harbour Deep	278	19
	Main Brook	514	11
	Roddickton	1142	4
	-Bide Arm	339	4.1
	-Conche	464	4.2
	-Englee	998	4.3
	Saint Anthony	3107	1
	-Boat Harbour	211	1.01
	-Cape Onion - Ship Cove	279	1.02
	-Cook's Harbour	388	1.03
	-Goose Cove East	368	1.04
	-Great Brehat	120	1.05
	-Hay Cove et al	424	1.06
	-Raleigh	373	1.07
	-St. Anthony Bight	214	1.08
	-St. Carrol's	92	1.09
	-St. Lunaire - Grandois	1010	1.1
	-Wild Bight	54	1.11
	St. Julian's - Grandois	135	31
Central Newfoundland	Change Islands	580	10
	Fogo	1105	5
	-Deep Bay	152	5.1
	-Island Harbour	281	5.2
	-Joe Batt's Arm et al	1155	5.3
	-Seldom	560	5.4
	-Stag Harbour	310	5.5
	-Tilting	427	5.6
	Little Bay Islands	407	16
	St. Brendan's	468	12
	-Dock Cove	98	12.1
	-Hayward's Cove	58	12.2
	-Shalloway Cove	155	12.3
	Westport	467	13
	-Purbeck's Cove	61	13.1
Southern Newfoundland	Burgeo	2504	2
	Francois	219	27
	Grand Bruit	80	37
	Grey River	234	24
	La Poile	186	29
	McCallum	243	22
	Monkstown	112	33
	Petites	108	34
	Petit Forte	90	36
	Ramea	1386	3
	Rencontre East	230	25
	South East Bight	115	32

Note: Decimals are used where several communities are located close together.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REMOTE COMMUNITY
ELECTRICAL TRANSMISSION LINES
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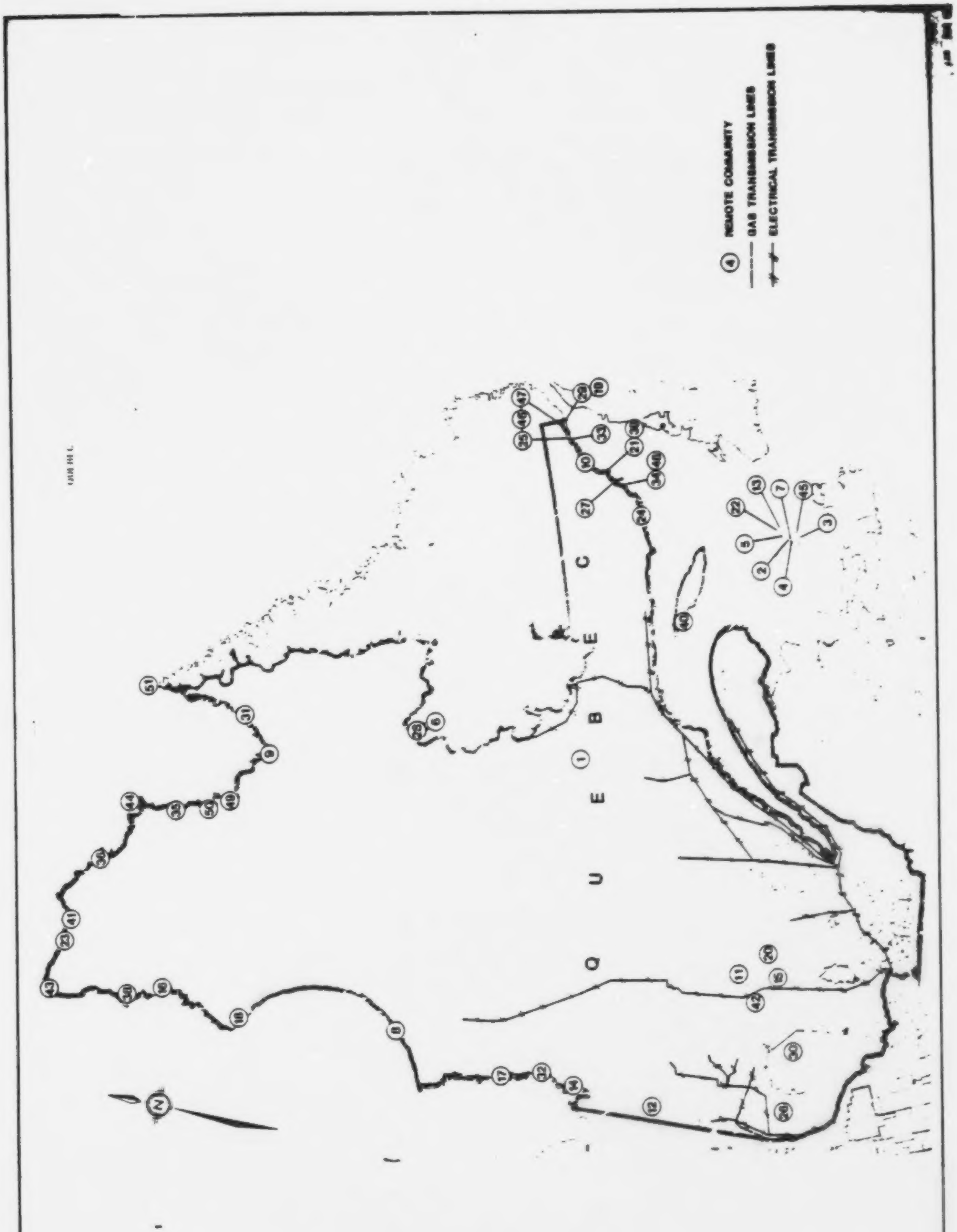
200
300
400 km

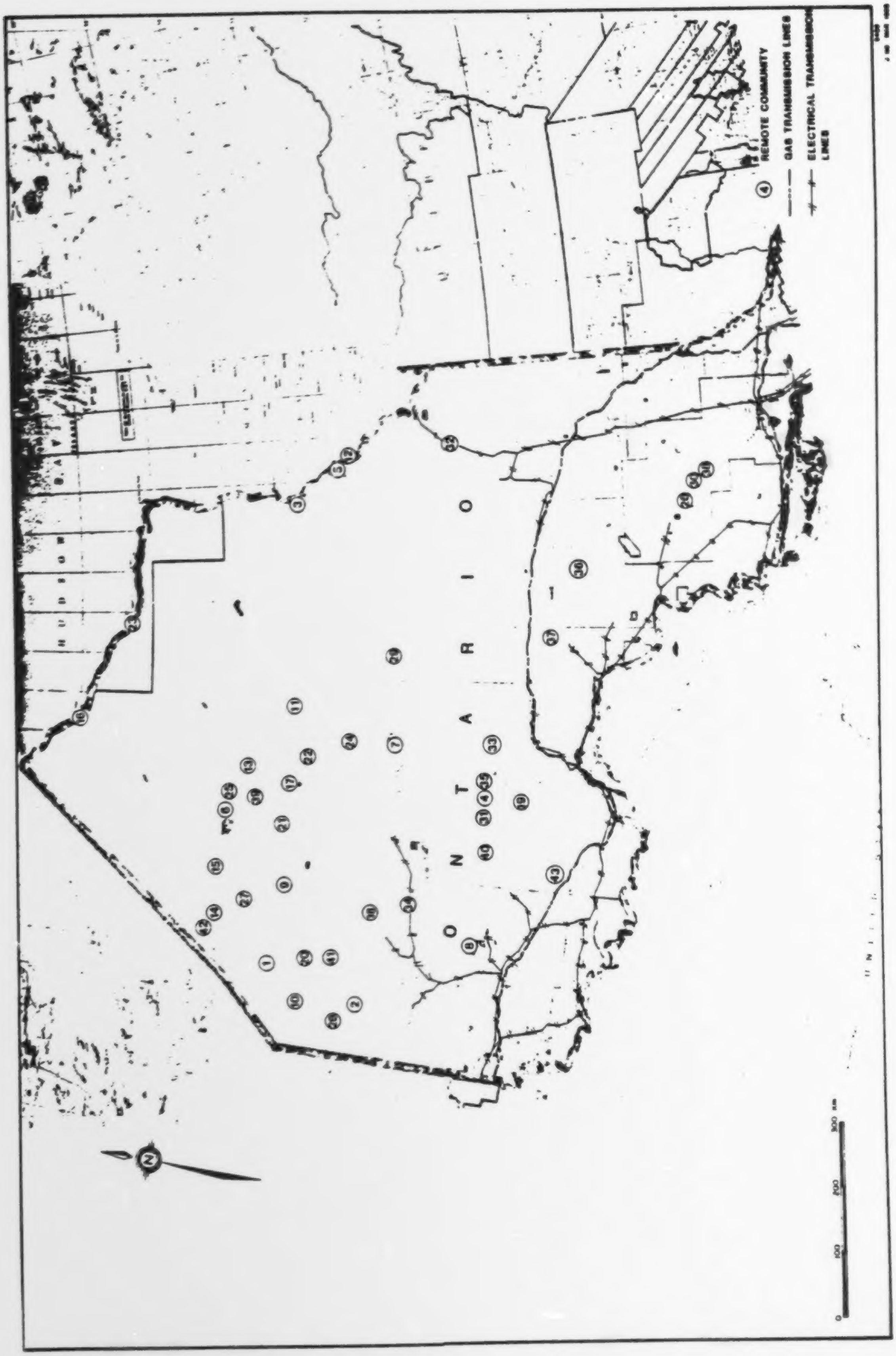
QUEBEC

	Name	Pop'n	MapNo
Nouveau Quebec	Akulivik (Cape Smith)	241	38
	Asbestos Hill	200	41
	Aupaluk	102	50
	Inukjuak (Port Harrison)	650	18
	Ivujivik (C. Wolstenholme)	184	43
	Kangiksuk (Payne Bay)	279	35
	Kangiqsualujjuaq(George R)	333	31
	Kangiqsujuaq (Maricourt)	279	36
	Killinik	-0-	51
	Kuujjuak (Fort Chimo)	1068	9
	Kuujjuaraapik (P. Baleine)	1133	8
	Povungnituk	752	16
	Quaqtaq	163	44
	Salluit	518	23
	Tasiujak (Leaf Bay)	106	49
	Uumaruk	-0-	52
Central Quebec	Belleterre	470	26
	Clova	200	42
	Eastmain	329	32
	Fort Rupert	946	14
	Gagnon	3500	1
	Kawawchikamach	397	28
	Lac Rapide	337	30
	Obedjiwan	1103	11
	Parent	800	15
	Schefferville	1928	6
	Selbaie	1000	12
	Wemindji	674	17
	Weymontachie	613	20
Lower North Shore	Anticosti	224	40
	La Romaine	511	24
	La Tabatiere	526	21
	-Aylmer Sound	110	48
	-Chevery	228	39
	-Harrington Harbour	311	34
	-Mutton Bay	260	37
	-Tete a la Baleine	446	27
	Lourdes de Blanc Sablon	625	19
	-Blanc Sablon	361	29
	-Bradore Bay	123	47
	-Middle Bay	143	46
	-Old Fort Bay	312	33
	-St. Paul's River	495	25
	St. Augustin	1059	10
Magdalen Islands	Cap-aux-Meules	1350	7
	-Etang du Nord	2702	4
	-Fatima	3109	2
	-Grand Entree	979	13
	-Grosse Ile	523	22
	-Havre aux Maison	2500	5
	-Havre Aubert	2974	3
	Iles d'Entree	154	45


④ REMOTE COMMUNITY
GAS TRANSMISSION LINES
ELECTRICAL TRANSMISSION LINES
Q U E B E C
N

ONTARIO

	Name	Pop'n	MapNo
Native Coastal	Attawapiskat	828	3
	Fort Albany	447	12
	Fort Severn	318	16
	Kashechewan	798	5
	Winisk	232	23
Rail Community	Allan Water	50	40
	Armstrong	800	4
	Auden	85	33
	Biscotasing	135	38
	Collins	100	31
	Ferland	81	35
	Graham	90	43
	Hillsport	68	37
	Moose River Crossing	90	32
	Oba	75	36
	Ramsey	127	30
	Sultan	179	26
Native Interior	Angling Lake(Wapekaka)	206	25
	Bearskin Lake	336	15
	Big Trout Lake	750	6
	Cat Lake	315	18
	Deer Lake	481	10
	Fort Hope	705	7
	Gull Bay	286	19
	Kasabonika	444	13
	Kingfisher	253	21
	Lac Seul	537	8
	Lansdowne House	209	24
	Long Dog Lake	35	39
	MacDowell	26	41
	Muskrat Dam	173	27
	North Spirit Lake	282	20
	Ogoki/Marten Falls	150	29
	Pikangikum	946	2
	Ponask	31	42
	Poplar Hill	171	28
	Sachigo	339	14
	Sandy Lake	1344	1
	Slate Falls/Fry Lake	82	34
	Summer Beaver	250	22
	Weagamow(Caribou Lake)	531	9
	Webequie	455	11
	Wunnummin Lake	318	17


HUDSON BAY
ONTARIO
④ REMOTE COMMUNITY
GAS TRANSMISSION LINES
ELECTRICAL TRANSMISSION LINES
N
0
100
200
300 km

ALBERTA

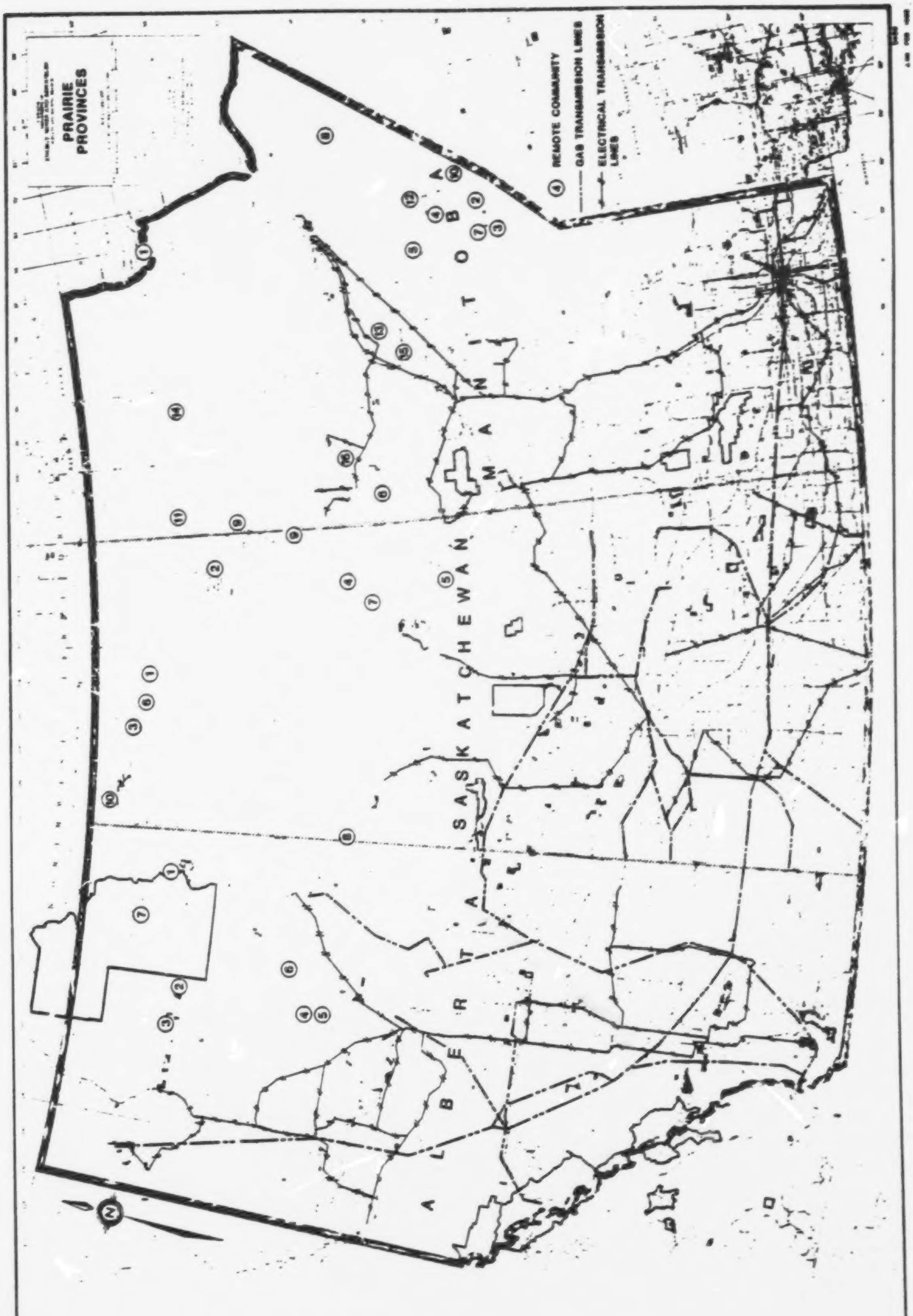
Name	Pop'n	MapNo
Fort Chipewyan	1600	1
Jean d'Or Prairie	650	3
Fox Lake	750	2
Trout Lake AB	203	5
Peerless Lake	204	4
Chipewyan Lake	150	6
Peace Point	65	7
Garden Creek	150	8

SASKATCHEWAN

Name	Pop'n	MapNo
Black Lake	720	1
Brabant	129	7
Camsell Portage	61	10
Deschambault	517	5
Fond du Lac	540	3
Garson Lake	84	8
Kinoosac	81	9
Southend	528	4
Stony Rapids	249	6
Wollaston	543	2

MANITOBA

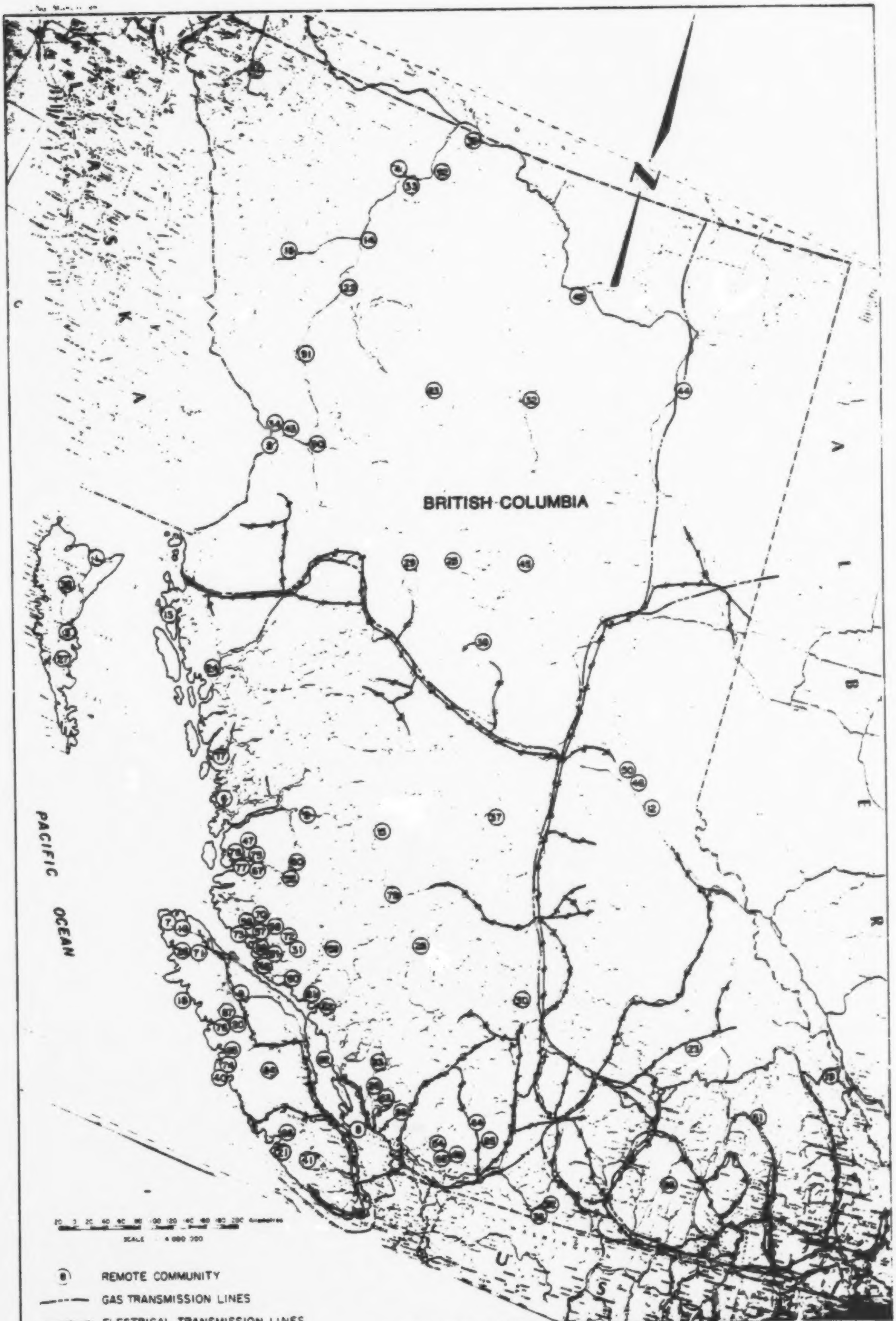
Name	Pop'n	MapNo
Brochet	640	9
Garden Hill	1800	2
God's Lake Narrows	1250	4
God's River	250	12
Granville Lake	140	16
Lac Brochet	380	11
Oxford House	1250	5
Pikwitonei	203	13
Pukatawagan	1100	6
Red Sucker Lake	425	10
St. Theresa Point	1450	3
Shamattawa	680	8
Tadoule Lake	215	14
Thicket Portage	200	15
Waasagomach	730	7
Churchill	1600	1


PRAIRIE PROVINCES
REMOTE COMMUNITY
GAS TRANSMISSION LINES
ELECTRICAL TRANSMISSION LINES
ALBERTA
SASKATCHEWAN
MANITOBA
N

BRITISH COLUMBIA

Name	Pop'n	MapNo
ACTEON SOUND	45	56
ANAHIM LAKE	372	15
ATLIN	475	11
BAKER MINE CAMP	30	83
BAMFIELD	250	21
BARCLAY DIV. (KILDONAN)	45	66
BARR CREEK	25	87
BELLA BELLA	1414	6
BELLA COOLA	3047	2
BIG BAR/JESMOND CREEK AREA	133	30
BOB QUINN LAKE	17	91
BOULDER BAY	45	68
CASSIAR	1850	4
CHRISTIAN VALLEY	23	86
CLEAGH CREEK	45	71
DEASE LAKE	425	14
DOME CREEK / CRESCENT SPUR	475	12
DRURY INLET	45	73
EARLS CREEK	25	88
EASTGATE	50	52
ERICKSON GOLD MINE VILLAGE	130	33
FIELD	270	19
FORT BABINE IR #6	170	29
FORT WARE	145	32
GERMANSEN LANDING	77	45
GILFORD ISLAND	67	48
GOOD HOPE LAKE - HIGHWAYS	12	92
GREENWOOD CAMP	64	74
HARTLEY BAY	214	24
HESQUIAHT	90	40
HOLBERG	476	10
HOLBERG DND	650	7
HORNET	30	85
ISKUT/EDDONTENAJON	250	22
JUSKATLA	100	38
KILBELLA BAY	61	75
KINGCOME INLET	134	31
KINGCOME INLET (WHONNOCK)	45	72
KITKATLA	463	13
KLEMTU	313	17
KNIGHT INLET	45	59
KYUQUOT	300	18
LASQUETI ISLAND	457	8
LONGWORTH	53	50
LOWER POST	123	35
MACHMELL	45	55
MAHATTA RIVER	200	26
MANNING PROVINCIAL PARK	121	36
MASSET	3175	1
MCNAB CAMP	24	89
MEZIADIN LAKE - HIGHWAYS	17	90
MOOYAH BAY (NOOTKA)	45	65

Name	Pop'n	MapNo
MOSES INLET	70	47
NARROWS INLET LOGGING DIV.	45	53
NAZKO INDIAN BAND	113	37
NEMAIAH VALLEY INDIAN BAND	175	28
NICKNAQUEET	40	77
NITINAHT	81	41
NUCHATLAHT	40	76
OWIKENO	45	67
PENNY	74	46
PHILLIPS ARM	45	61
PITT LAKE	45	54
PORT DOUGLAS (HARRISON)	45	64
PORTAGE (NANCUT)	95	39
PROPHET RIVER	79	44
QUATAM RIVER	45	62
SANDSPIT	3000	3
SAVARY ISLAND	31	82
SCOTT COVE	45	69
SCOTTY GOLD	80	43
SECHELL CREEK	45	63
SEWELL INLET	182	27
SEYMOUR ARM	142	23
SEYMOUR INLET	45	70
SHEEMAHANT	47	20
SHOTBOLT	40	78
SIMOON SOUND	32	81
STAVE LAKE	55	49
STEWART	1456	5
TAKLA	208	25
TATLA LAKE	37	79
TELEGRAPH CREEK	350	16
TIDE LAKE	125	34
TIMFOR	45	57
TOAD RIVER AREA	80	42
TOM BROWN LAKE	45	60
TROUT LAKE BC	50	51
VERNON	251	80
WAKEMAN SOUND	45	58
WESTERN MINES (MYRA FALLS)	30	84
WOSS	543	9


BRITISH COLUMBIA
PACIFIC OCEAN
A L A S K A
A L B E R T A
U S
N
SCALE 1:4 000 000
REMOTE COMMUNITY
GAS TRANSMISSION LINES
ELECTRICAL TRANSMISSION LINES

LOCATION MAP

YUKON

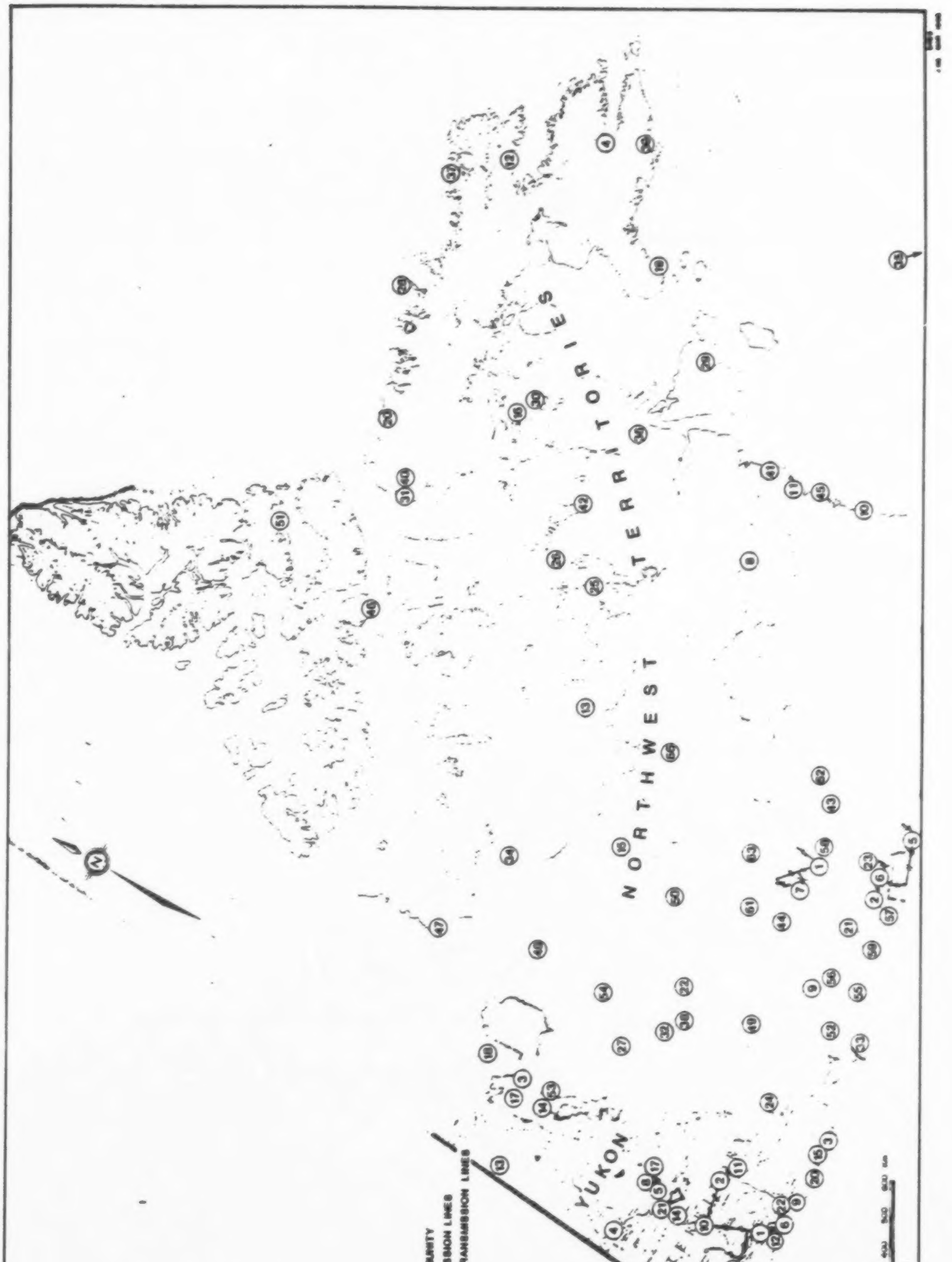
	Name	Pop'n	MapNo
Urban	Dawson City	900	4
	Watson Lake	1140	3
	Whitehorse	15000	1
Mining	Faro	1700	2
	Mayo	500	5
	Elsa	400	8
	Keno	90	17
Other	Beaver Creek	90	16
	Burwash Landing	70	19
	Destruction Bay	80	18
	Carcross	270	12
	Carmacks	340	10
	Haines Junction	460	7
	Johnsons Crossing	10	22
	Old Crow	240	13
	Pelly Crossing	180	14
	Ross River	325	11
	Stewart Crossing	20	21
	Swift River	35	20
	Tagish & Marsh Lake	480	6
	Teslin	368	9
	Upper Liard	130	15

NORTHWEST TERRITORIES

	Name	Pop'n	MapNo
Baffin	Arctic Bay	377	31
	Broughton Island	314	37
	Cape Dorset	725	19
	Clyde River	443	28
	Frobisher Bay	2454	4
	Grise Fiord	95	51
	Hall Beach	396	30
	Igloolik	766	16
	Lake Harbour	300	39
	Nanisivik	291	40
	Pangnirtung	909	12
	Pond Inlet	652	20
	Resolute	177	46
	Sanikiluaq	334	35
Keewatin	Baker Lake	1017	8
	Chesterfield Inlet	281	41
	Coral Harbour	414	29
	Eskimo Point	980	10

NORTHWEST TERRITORIES (Cont.)

	Name	Pop'n	MapNo
Keewatin	Rankin Inlet	956	11
	Repulse Bay	328	36
	Whale Cove	203	45
Kitikmeot	Bathurst Inlet	30	66
	Cambridge Bay	864	13
	Coppermine	766	15
	Gjoa Haven	493	25
	Holman	336	34
	Pelly Bay	281	42
	Spence Bay	470	26
Inuvik	Aklavik	756	17
	Arctic Red River	79	53
	Colville Lake	73	54
	Fort Franklin	554	22
	Fort Good Hope	446	27
	Fort McPherson	761	14
	Fort Norman	312	38
	Inuvik	2892	3
	Norman Wells	361	32
	Paulatuk	166	48
	Sachs Harbour	170	47
	Tuktoyaktuk	747	18
Fort Smith	Detah	143	58
	Enterprise	40	57
	Fort Liard	344	33
	Fort Providence	571	21
	Fort Resolution	523	23
	Fort Simpson	1001	9
	Fort Smith	2234	5
	Hay River	3345	2
	Jean Marie River	49	56
	Kakisa	36	59
	Lac la Martre	231	44
	Nahanni Butte	92	52
	Paradise Gardens	-0-	60
	Pine Point	1719	6
	Port Radium	140	50
	Rae Lakes	200	61
	Rae Edzo	1367	7
	Snare Lakes	61	63
	Snowdrift	254	43
	Trout Lake	61	55
	Tungsten	506	24
	Wrigley	163	49
	Yellowknife	9918	1


REMOTE COMMUNITY
GAS TRANSMISSION LINES
ELECTRICAL TRANSMISSION LINES
YUKON
NORTHWEST TERRITORIES
N
0 100 200 300 400 500 600 km

8.2 ENERGY USE CHARTS

Charts are presented for each region showing all of the communities in the region ranked in order of descending population for key energy categories. The values are based on the community profiles for 1982 and derivations from the spreadsheet program.

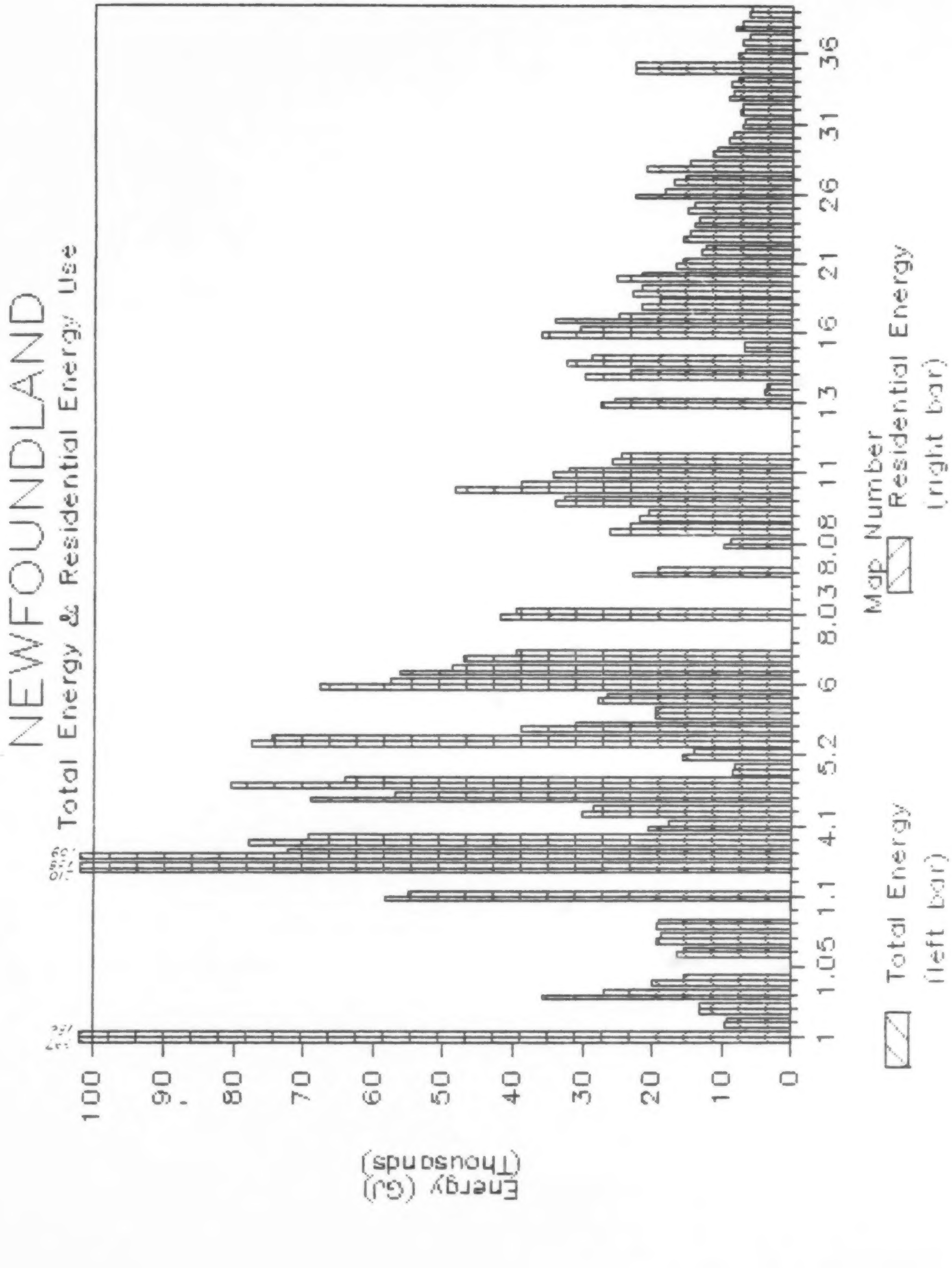
The categories used are:

Total Energy + Residential Energy Use
Total Nonrenewable Energy Use + Total Potential Energy Savings
Per Capita Energy + Per Capita Oil Use
Residential Electricity + Total Electricity Use

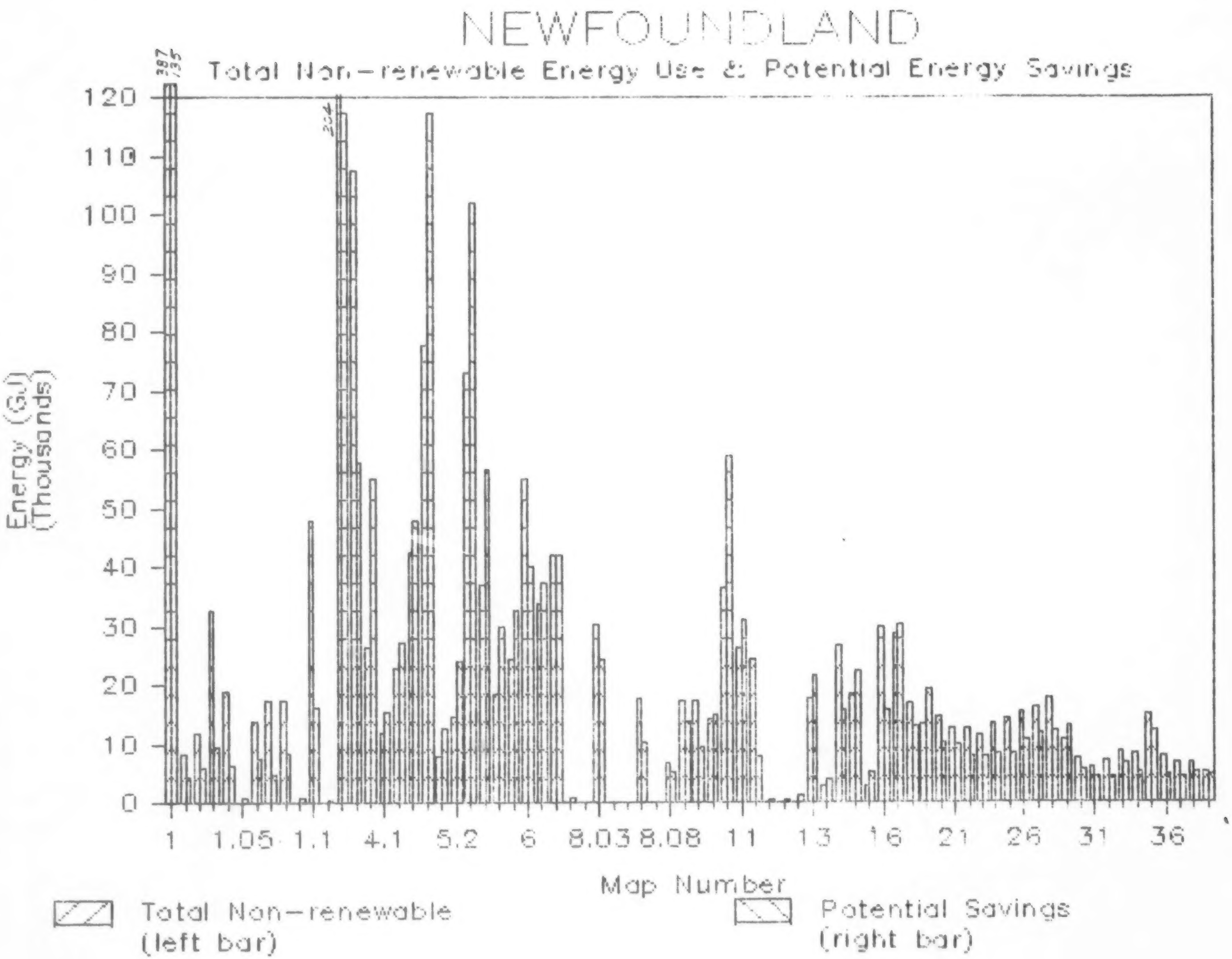
Note that where data is missing there is sometimes a blank or 0 shown. While some estimates can be made (ie. No. of homes = population/4) in other instances an estimate may be quite unreliable, and the category is better left blank until the information improves.

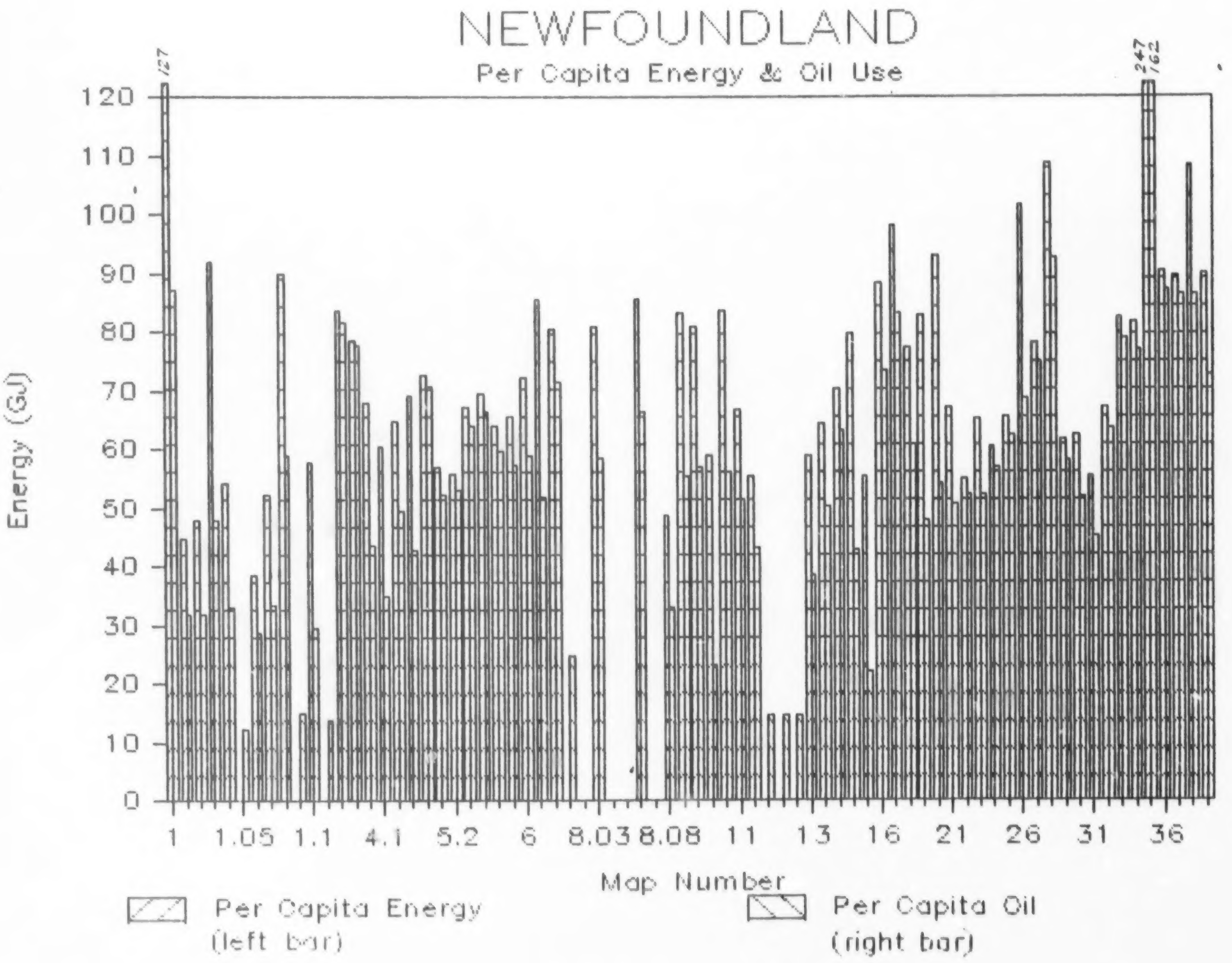
The various categories are defined as follows:

Total Energy:	Summary of Residential, Community, Commercial and Industrial Electricity and Space Heat. Transportation is excluded.
Residential Energy:	Residential Space Heat and Electricity.
Total Nonrenewable Energy:	Oil and Propane use in all categories (including diesel electricity).
Potential Energy Savings:	Summary of savings available through conservation.
Per Capita Energy:	Total Energy/Population.
Per Capita Oil Use:	Total Oil for Space Heat and Electricity (Residential + Commercial + Community + Industrial)/Population.
Residential Electricity:	Electricity use by the Residential Sector only.
Total Electricity:	Electricity use by the Residential, Community, Commercial and Industrial Sectors.



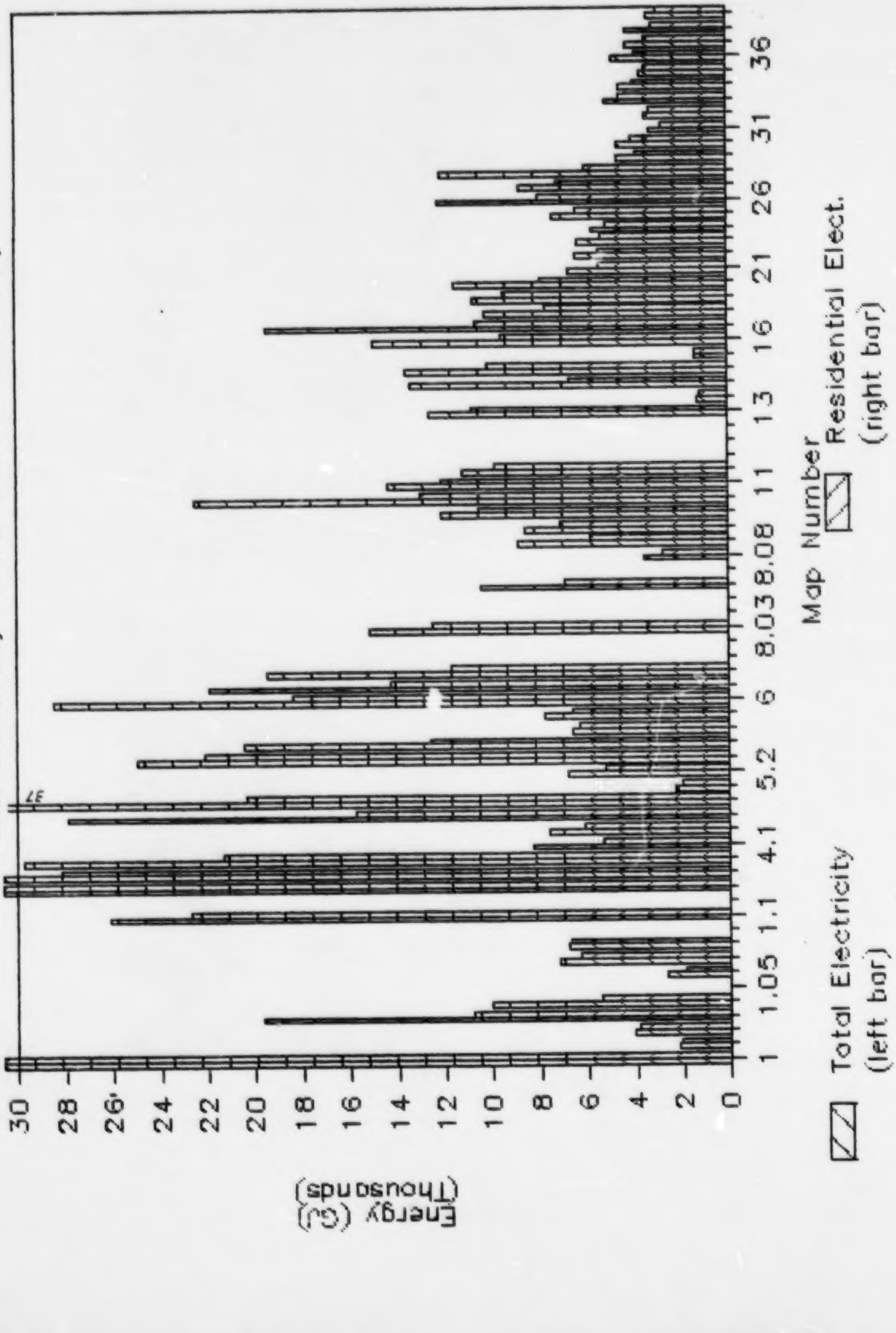
NEWFOUNDLAND
Total Energy & Residential Energy Use
Energy (GJ) (Thousands)
100
90
80
70
60
50
40
30
20
10
0
1
1.05
1.1
4.1
5.2
6
8.03
8.08
11
13
16
21
26
31
36
Map Number
▨ Total Energy (left bar)
▨ Residential Energy (right bar)

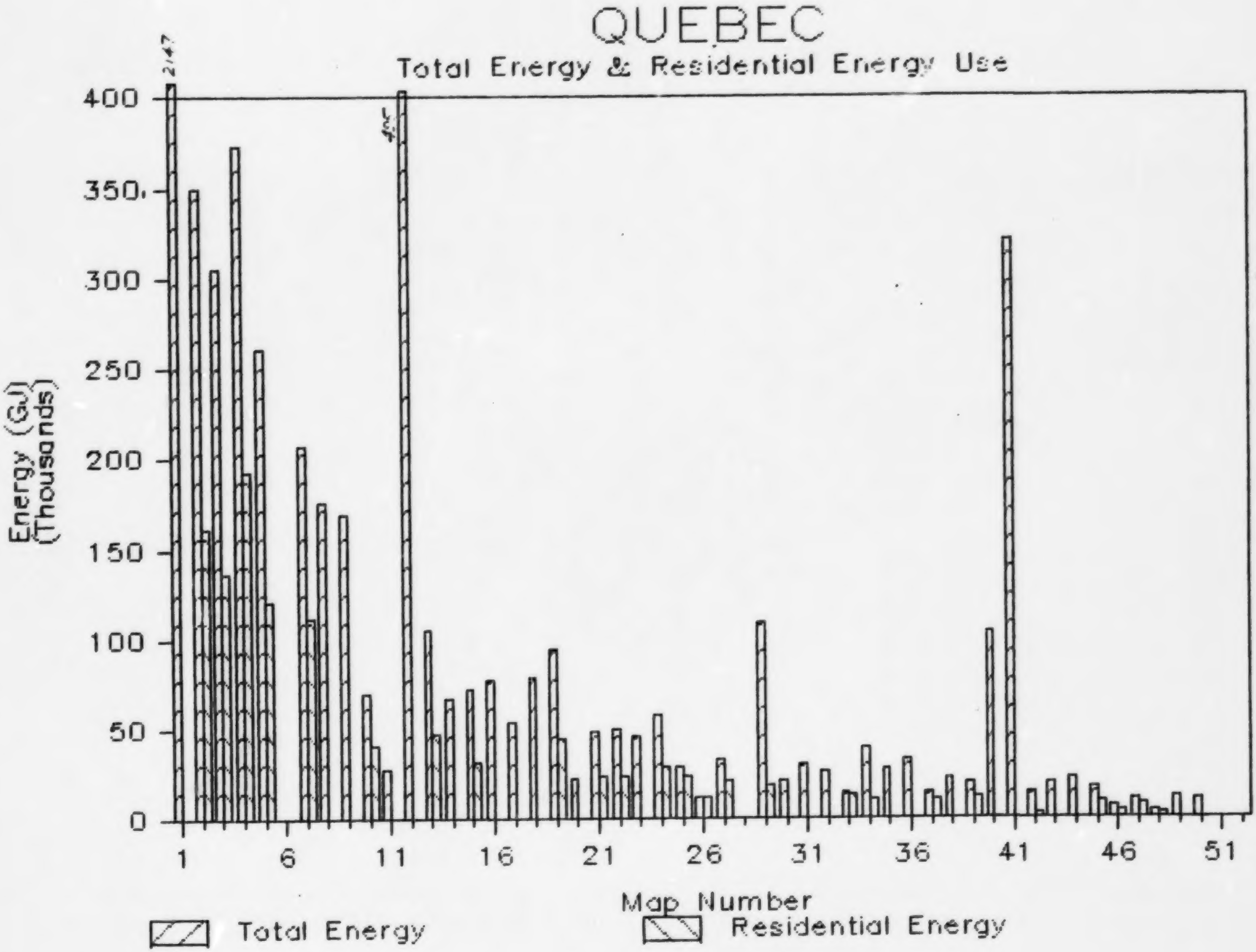

NEWFOUNDLAND
Total Non-renewable Energy Use & Potential Energy Savings
Energy (GJ)
(Thousands)
120
110
100
90
80
70
60
50
40
30
20
10
0
387
135
204
1
1.05
1.1
4.1
5.2
6
8.03
8.08
11
13
16
21
26
31
36
Map Number
Total Non-renewable
(left bar)
Potential Savings
(right bar)


NEWFOUNDLAND
Per Capita Energy & Oil Use
Energy (GJ)
120
110
100
90
80
70
60
50
40
30
20
10
0
127
247
162
1
1.05
1.1
4.1
5.2
6
8.03
8.08
11
13
16
21
26
31
36
Map Number
Per Capita Energy
(left bar)
Per Capita Oil
(right bar)

NEWFOUNDLAND

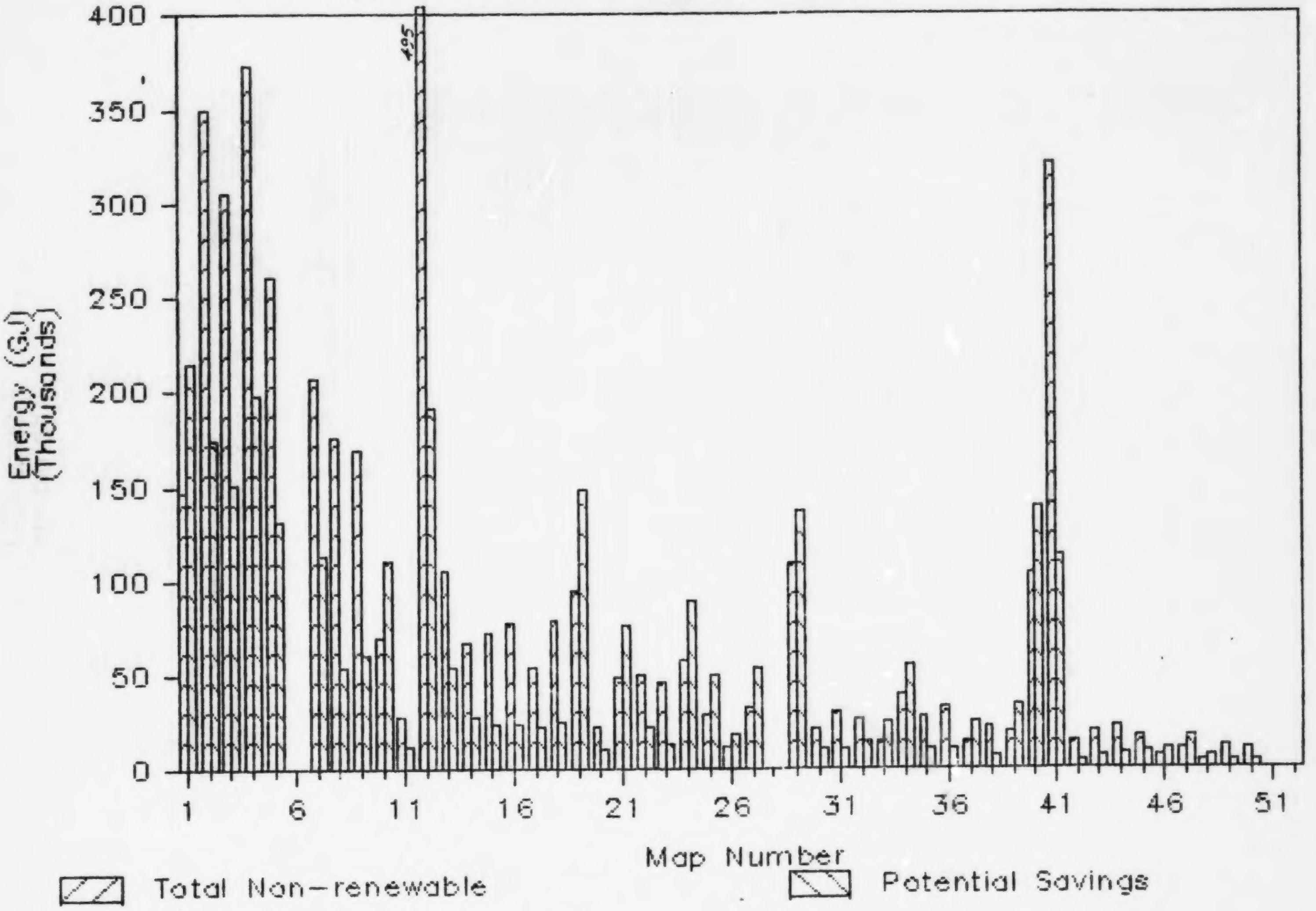
Total Electricity & Residential Electricity Use

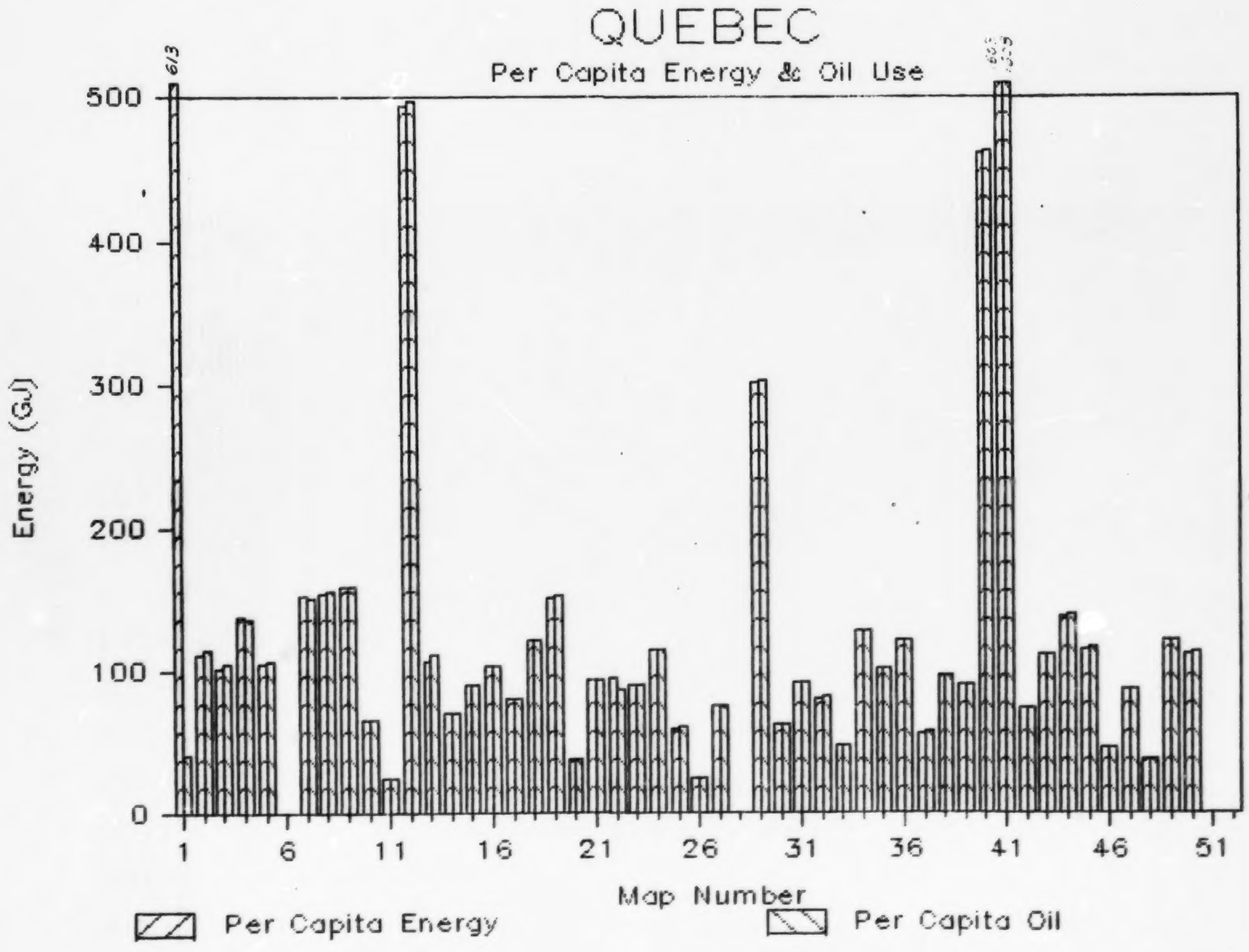



QUEBEC
Total Energy & Residential Energy Use
2147
405
Energy (GJ) (Thousands)
400
350
300
250
200
150
100
50
0
1
6
11
16
21
26
31
36
41
46
51
Map Number
Total Energy
Residential Energy

QUEBEC

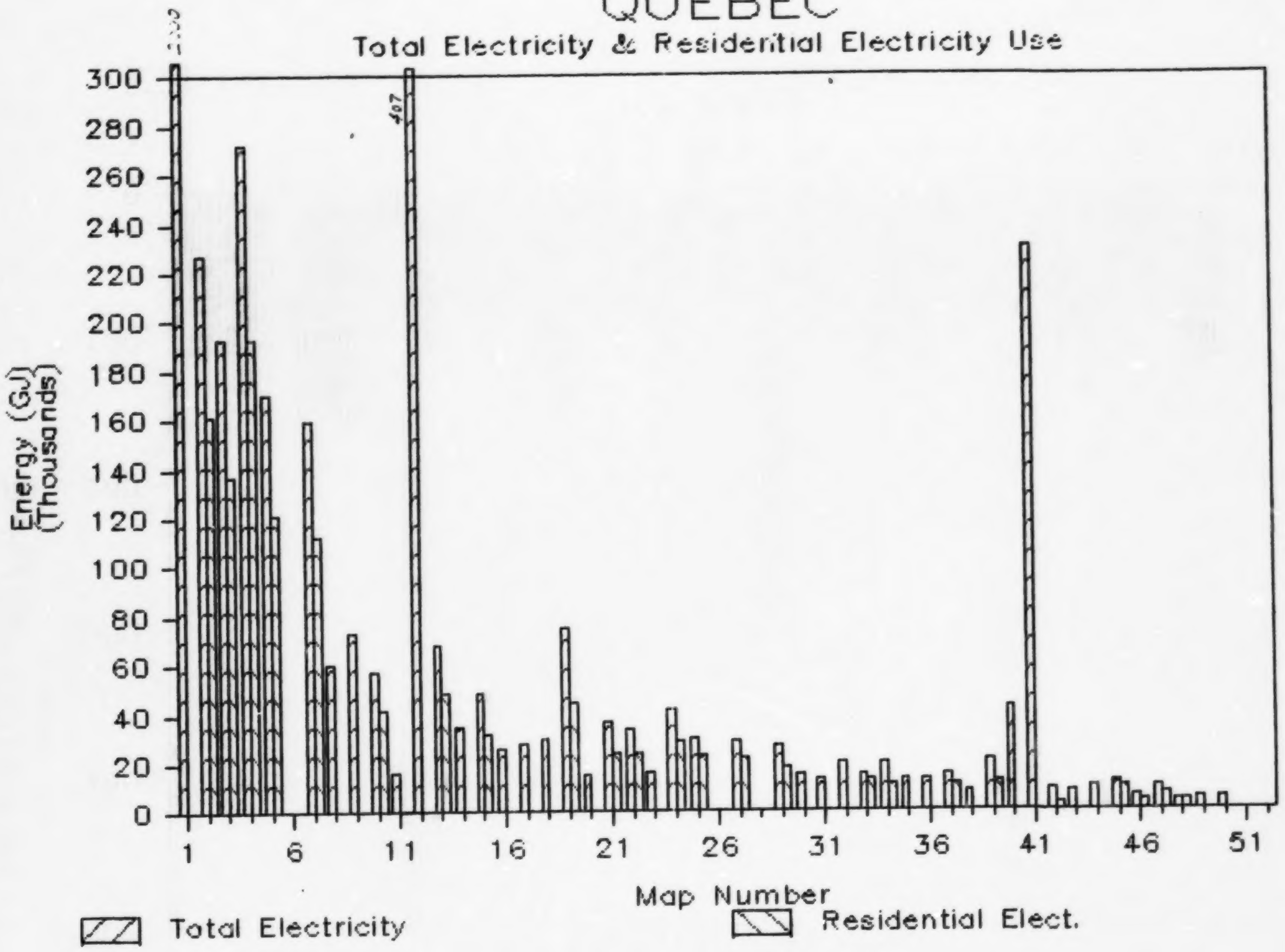
Total Non-renewable Energy Use & Potential Energy Savings




QUEBEC
Per Capita Energy & Oil Use
Energy (GJ)
500
400
300
200
100
0
613
1
6
11
16
21
26
31
36
41
46
51
Map Number
Per Capita Energy
Per Capita Oil

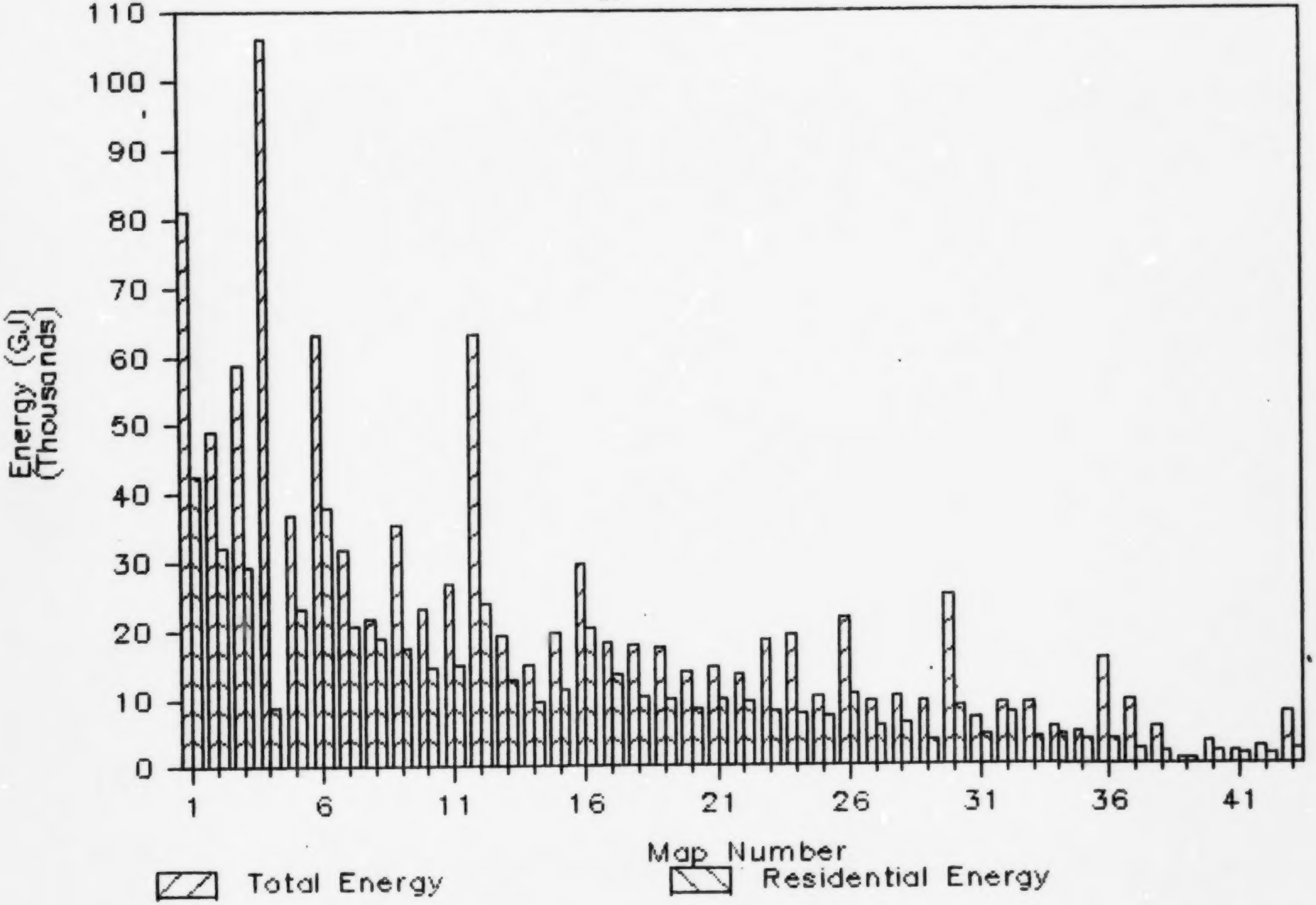
QUEBEC

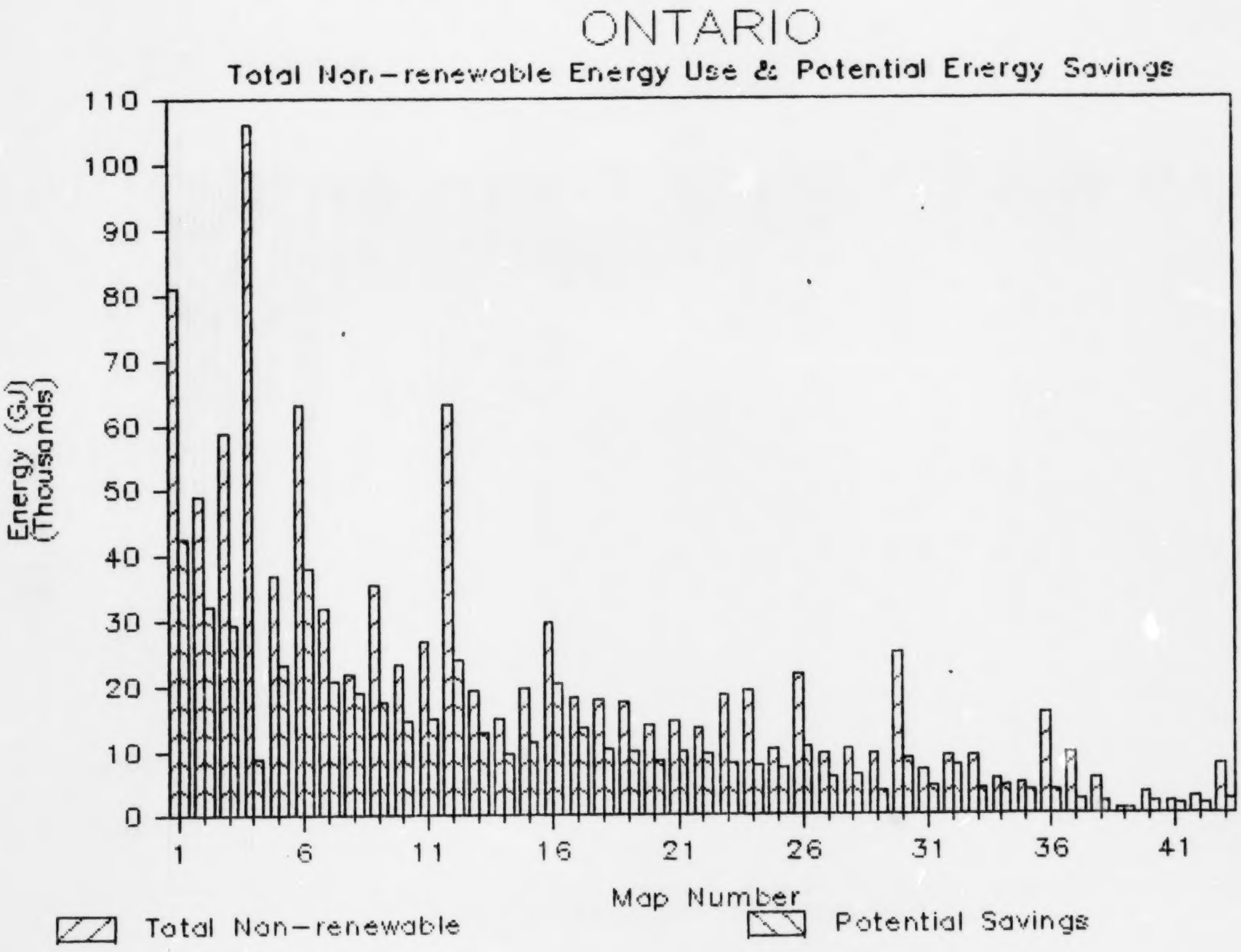
Total Electricity & Residential Electricity Use

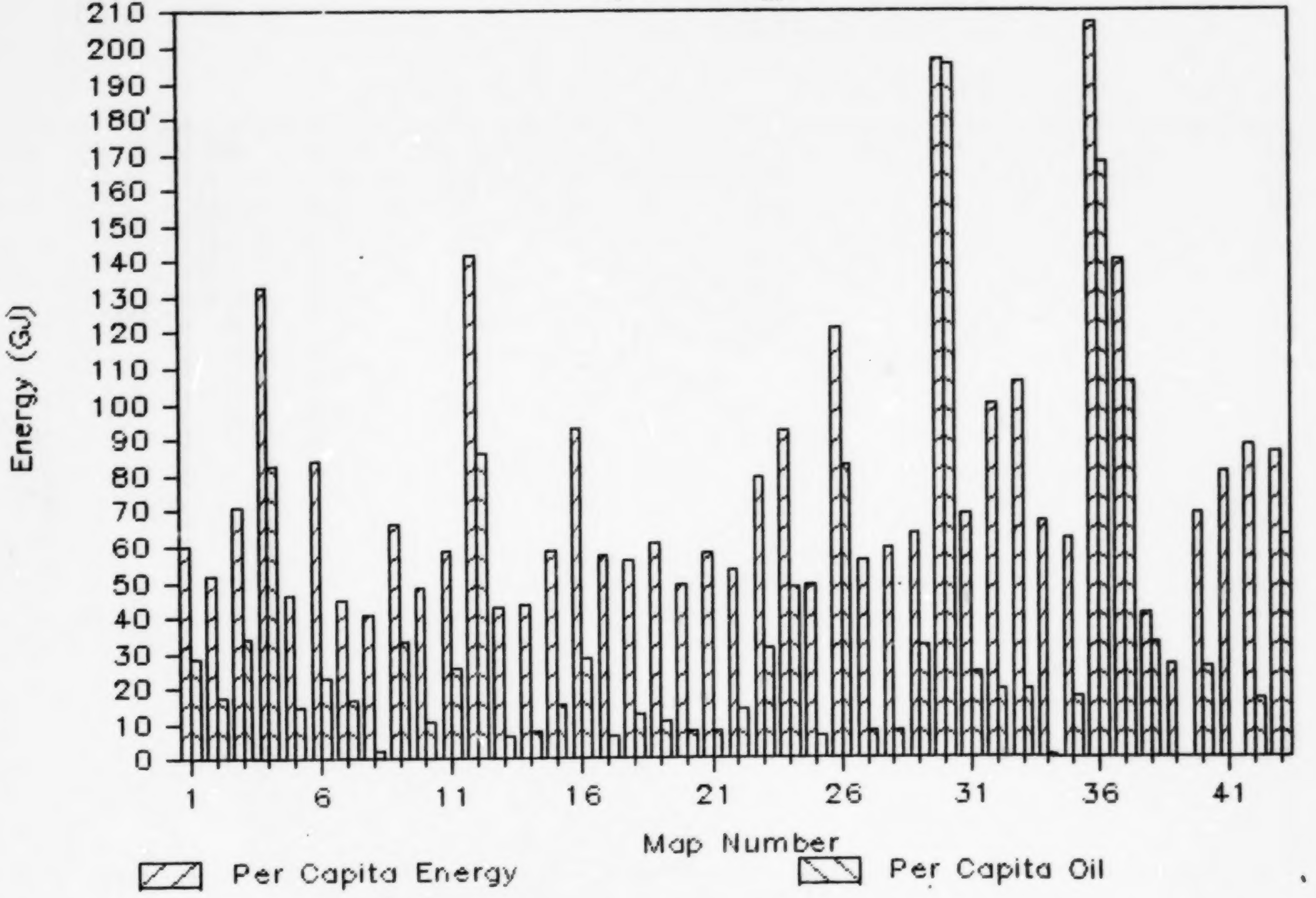


ONTARIO

Total Energy & Residential Energy Use

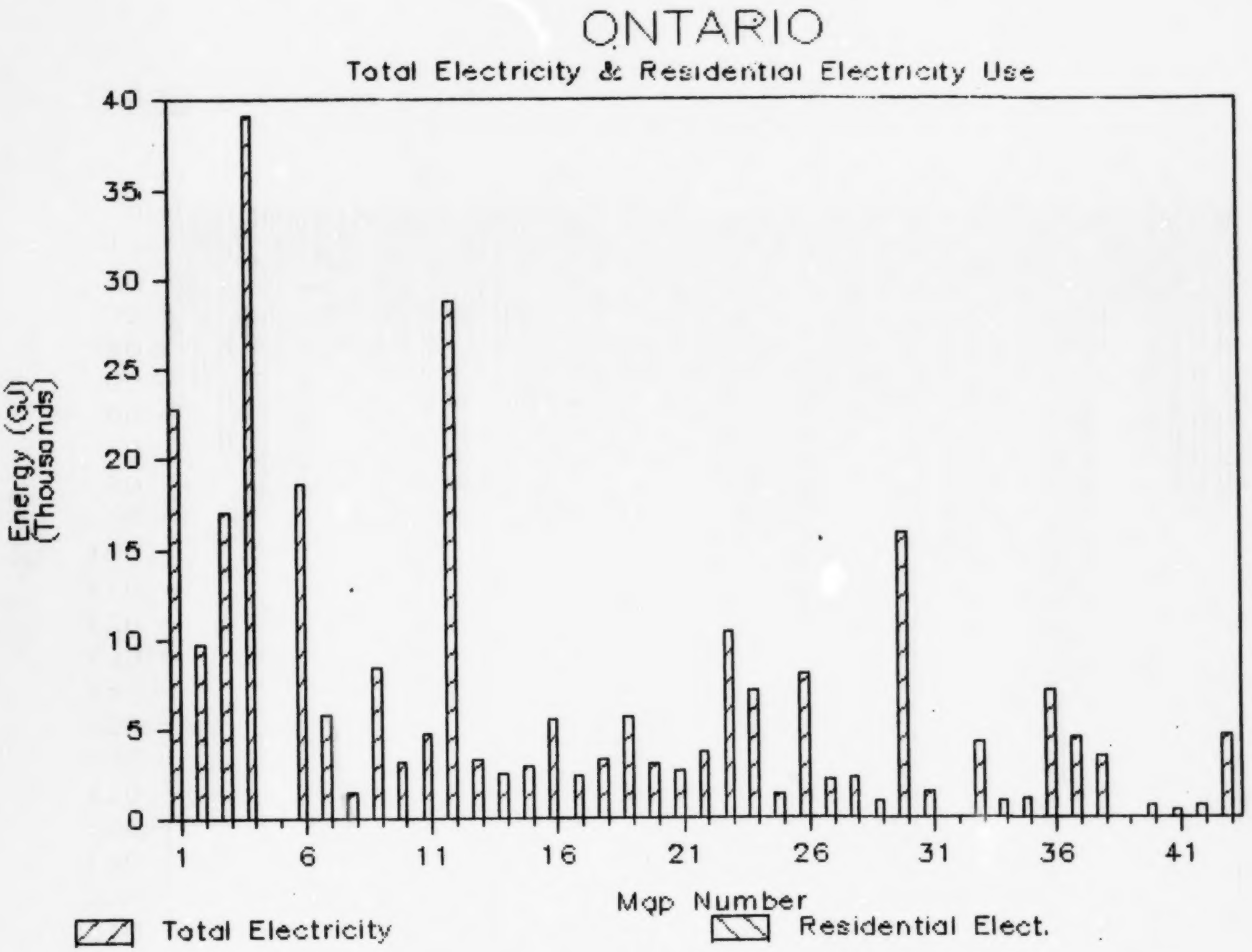



ONTARIO
Total Non-renewable Energy Use & Potential Energy Savings
Energy (GJ) (Thousands)
110
100
90
80
70
60
50
40
30
20
10
0
1
6
11
16
21
26
31
36
41
Map Number
Total Non-renewable
Potential Savings



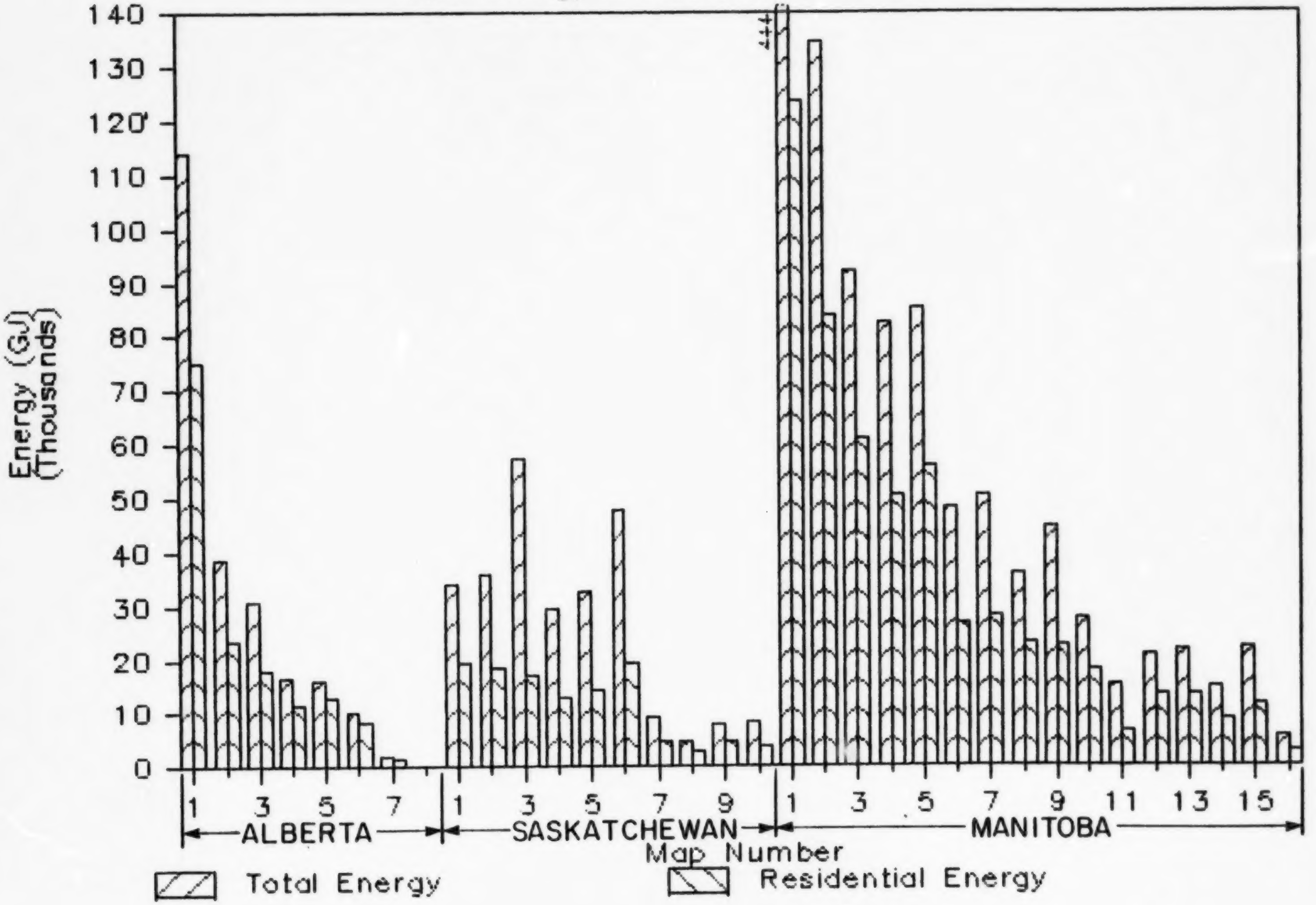
ONTARIO

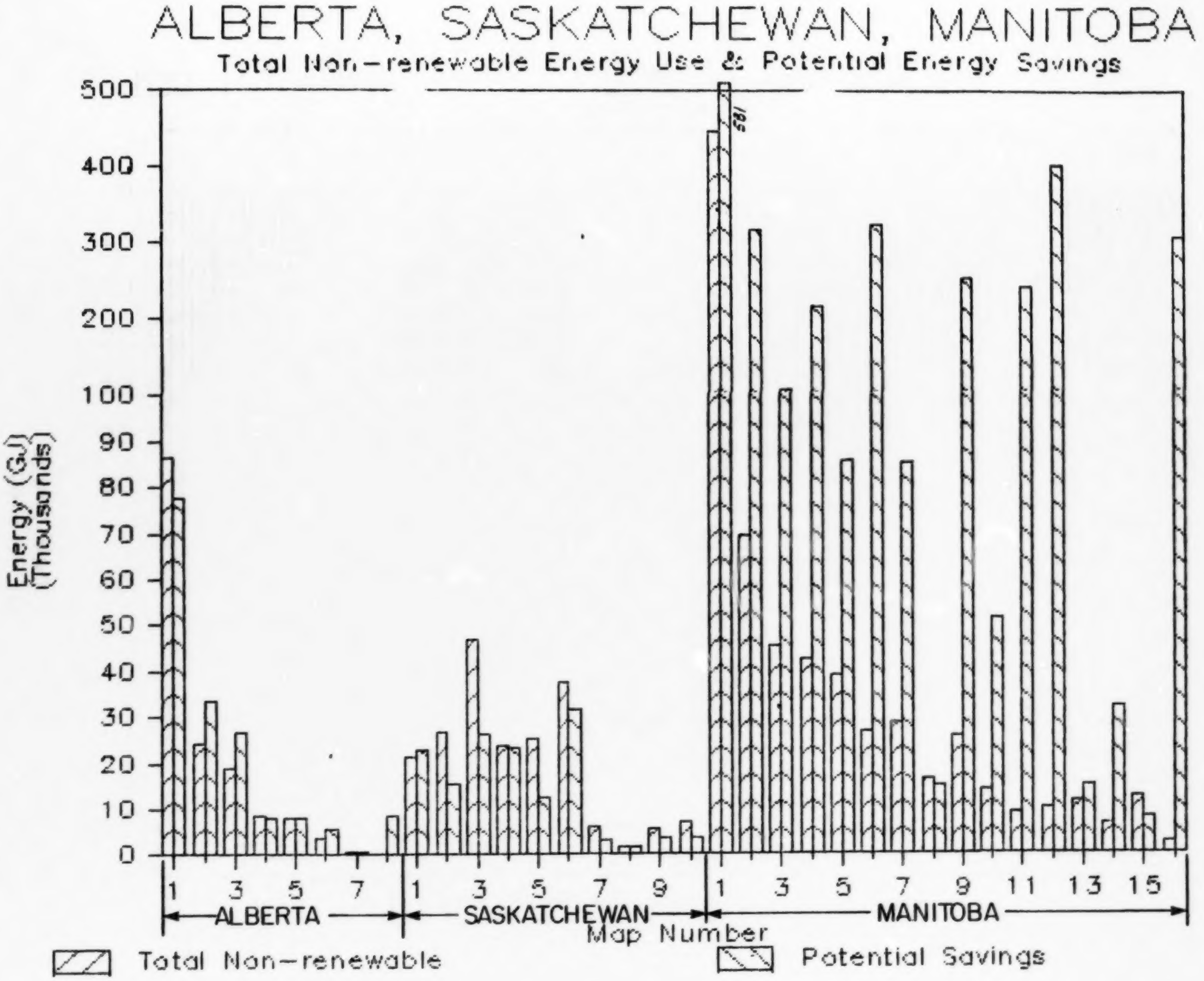
Per Capita Energy & Oil Use


ONTARIO
Total Electricity & Residential Electricity Use
Energy (GJ)
(Thousands)
40
35
30
25
20
15
10
5
0
1
6
11
16
21
26
31
36
41
Map Number
Total Electricity
Residential Elect.

ALBERTA, SASKATCHEWAN, MANITOBA

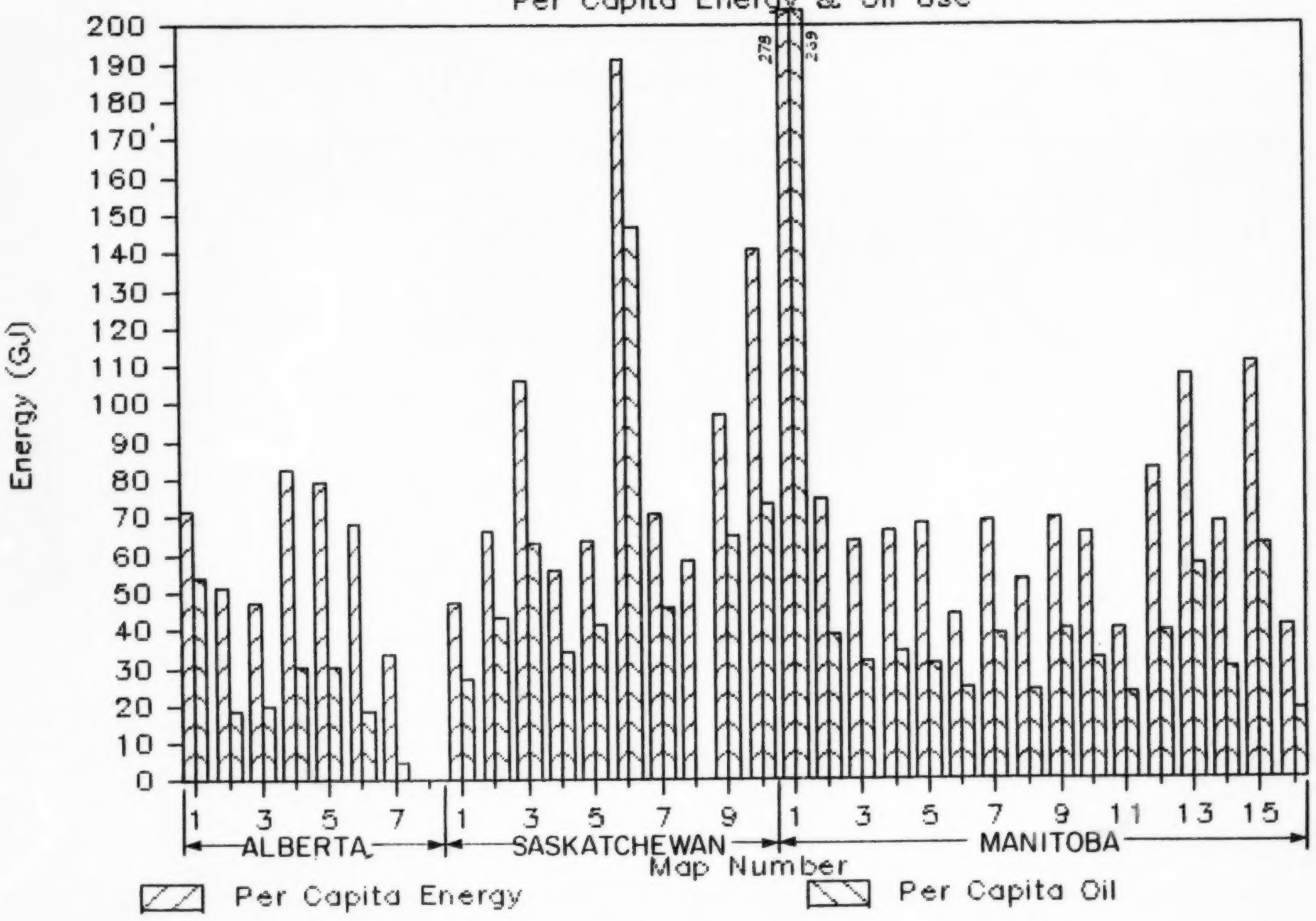
Total Energy & Residential Energy Use




ALBERTA, SASKATCHEWAN, MANITOBA
Total Non-renewable Energy Use & Potential Energy Savings
Energy (GJ) (Thousands)
500
400
300
200
100
90
80
70
60
50
40
30
20
10
0
185
1
3
5
7
1
3
5
7
9
1
3
5
7
9
11
13
15
ALBERTA
SASKATCHEWAN
MANITOBA
Map Number
Total Non-renewable
Potential Savings

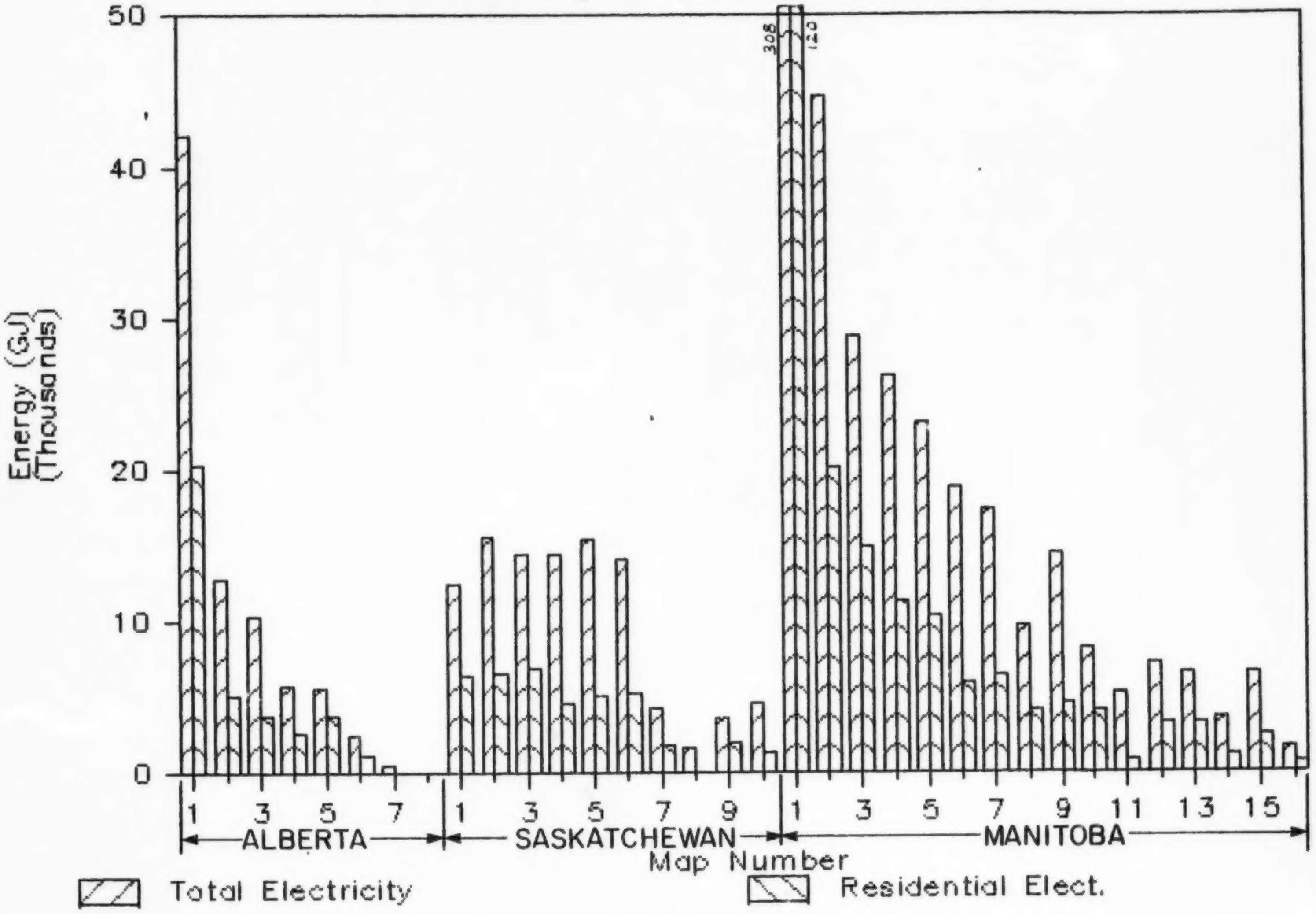
ALBERTA, SASKATCHEWAN, MANITOBA

Per Capita Energy & Oil Use



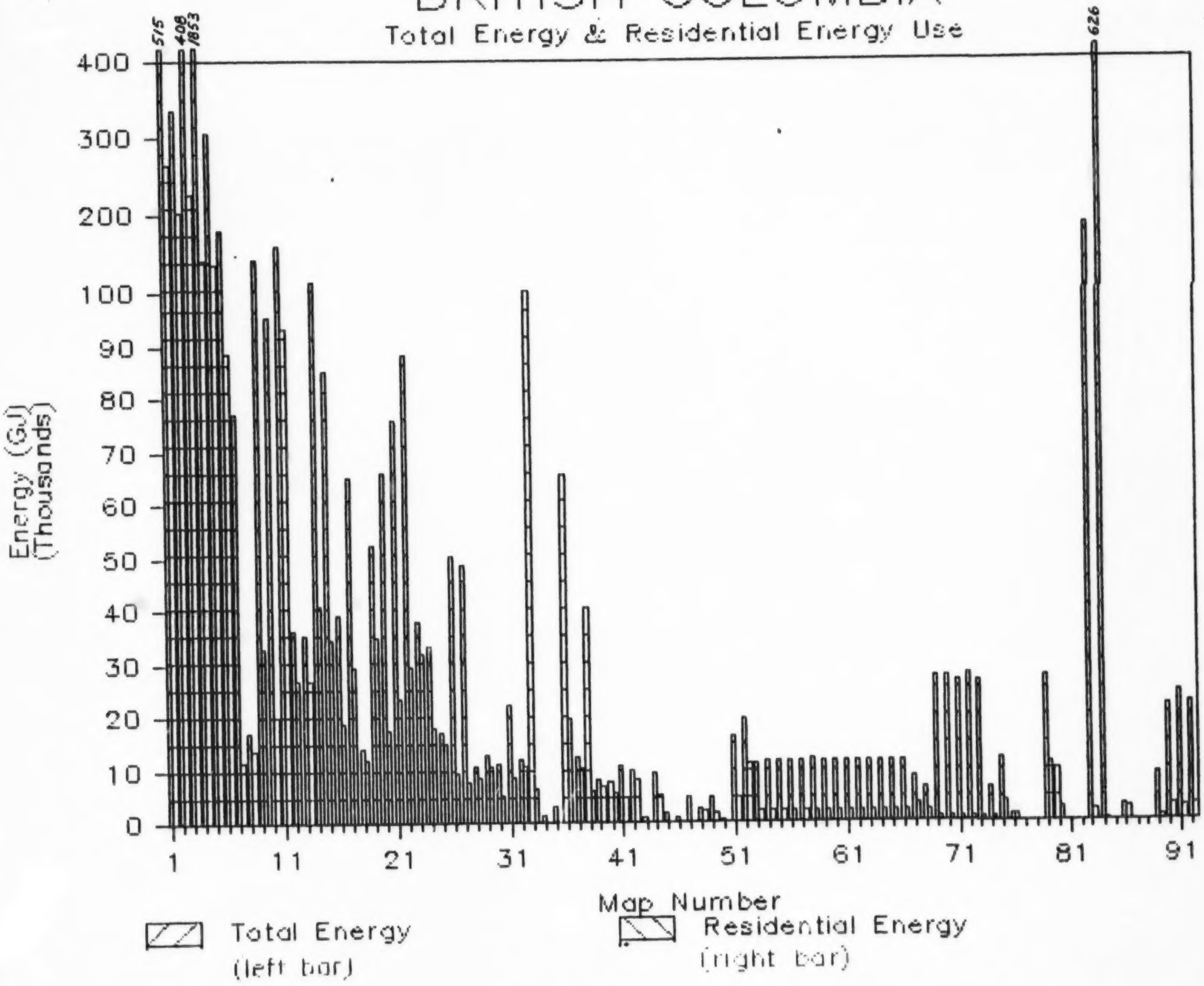
ALBERTA, SASKATCHEWAN, MANITOBA

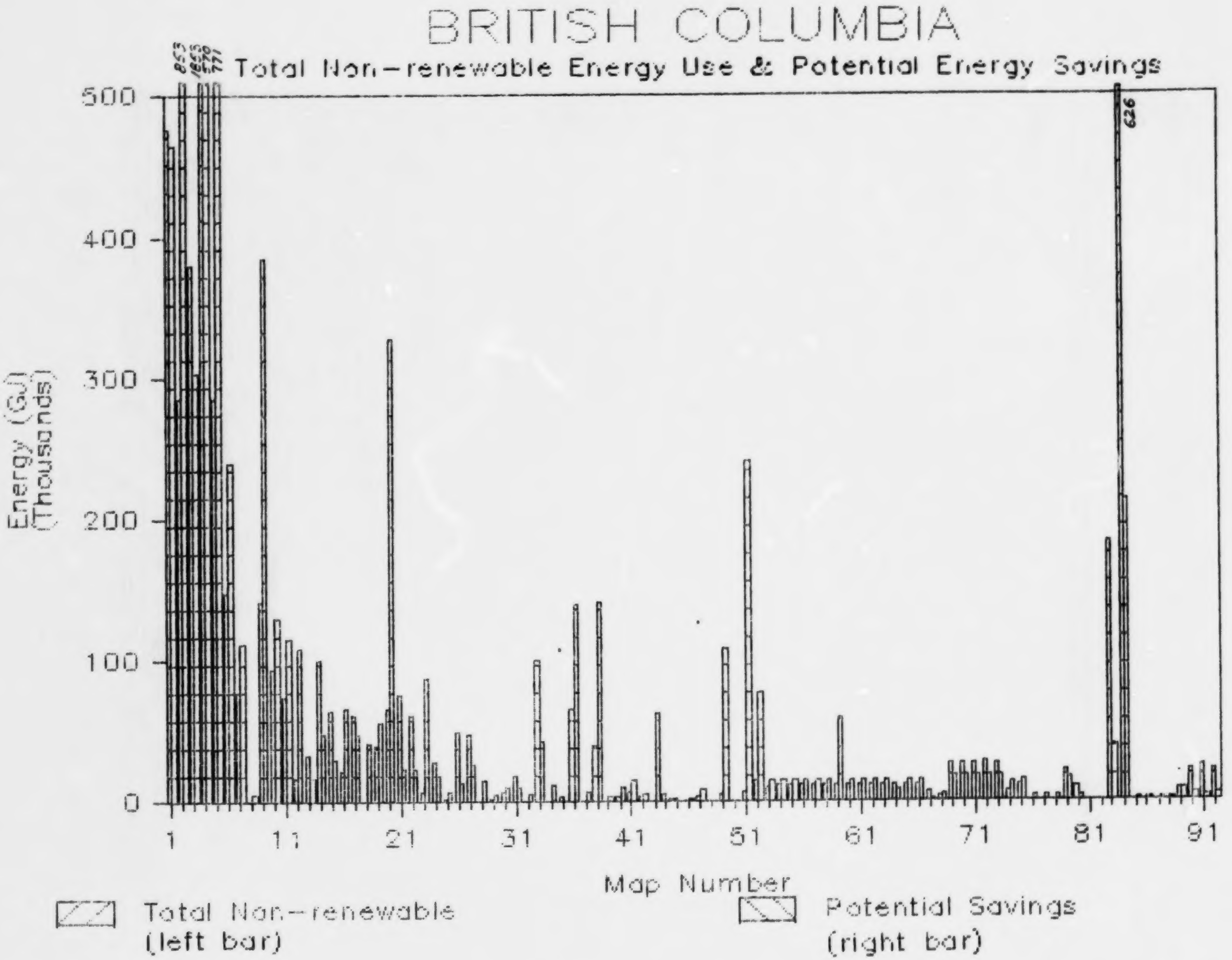
Total Electricity & Residential Electricity Use



BRITISH COLUMBIA

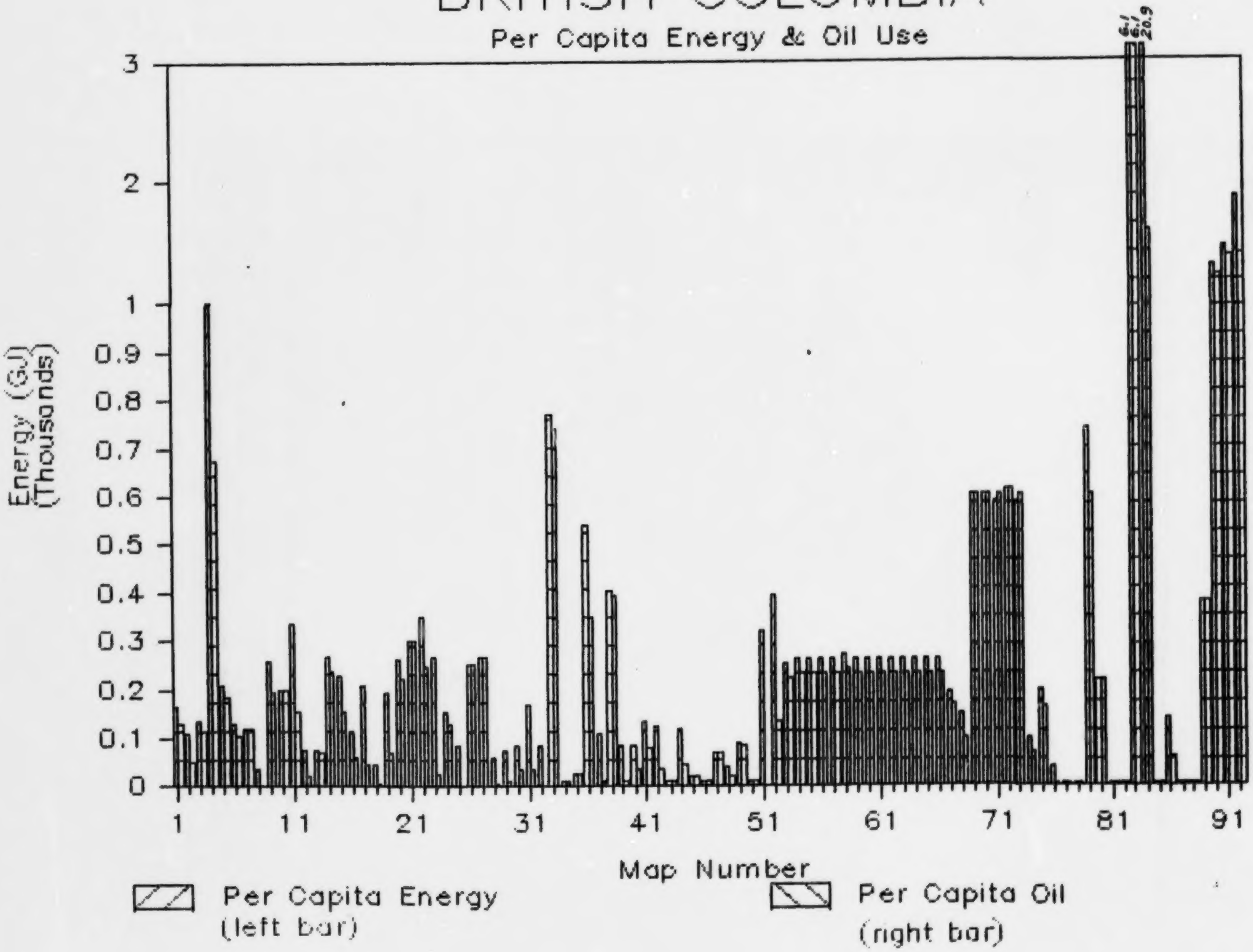
Total Energy & Residential Energy Use

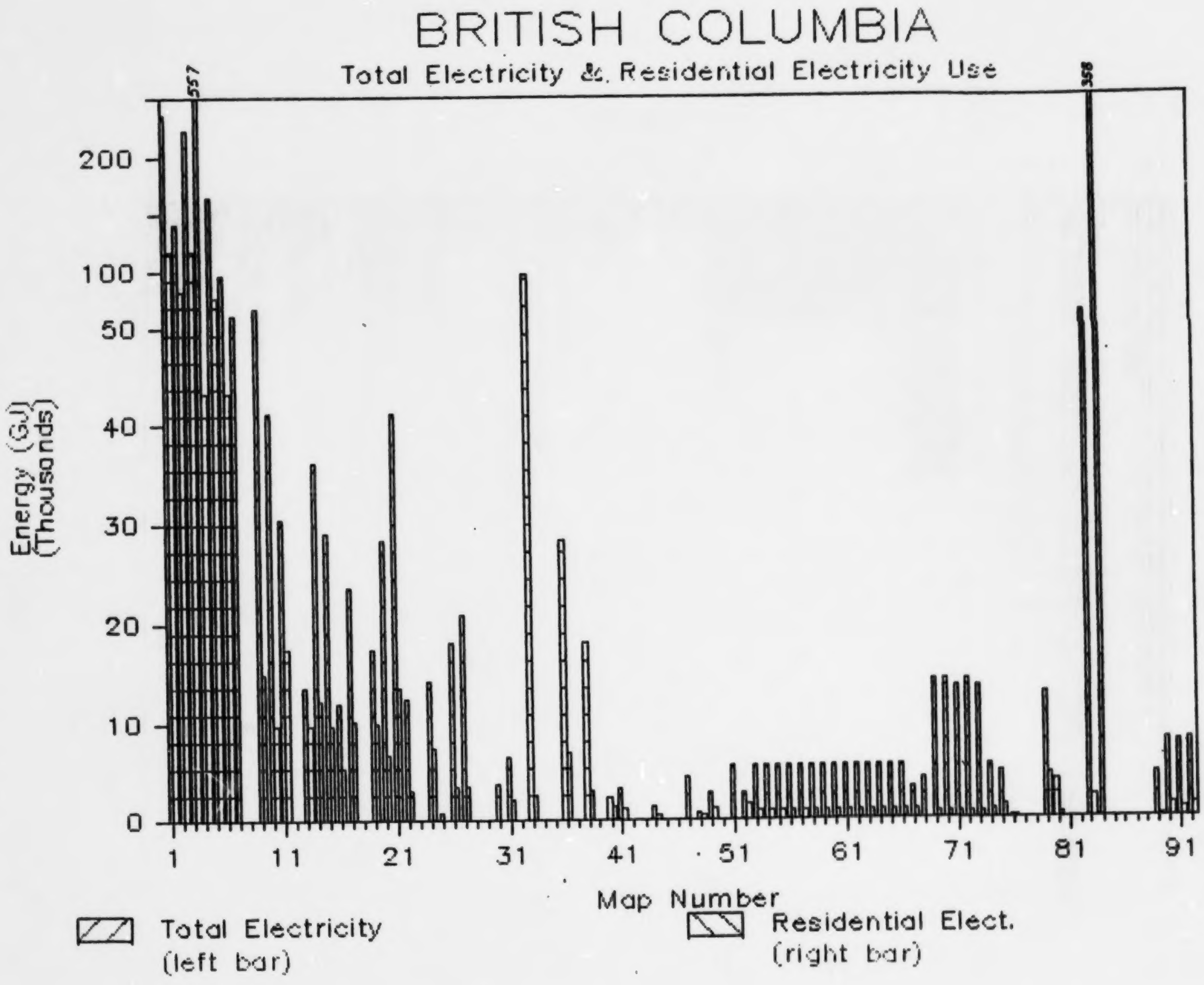


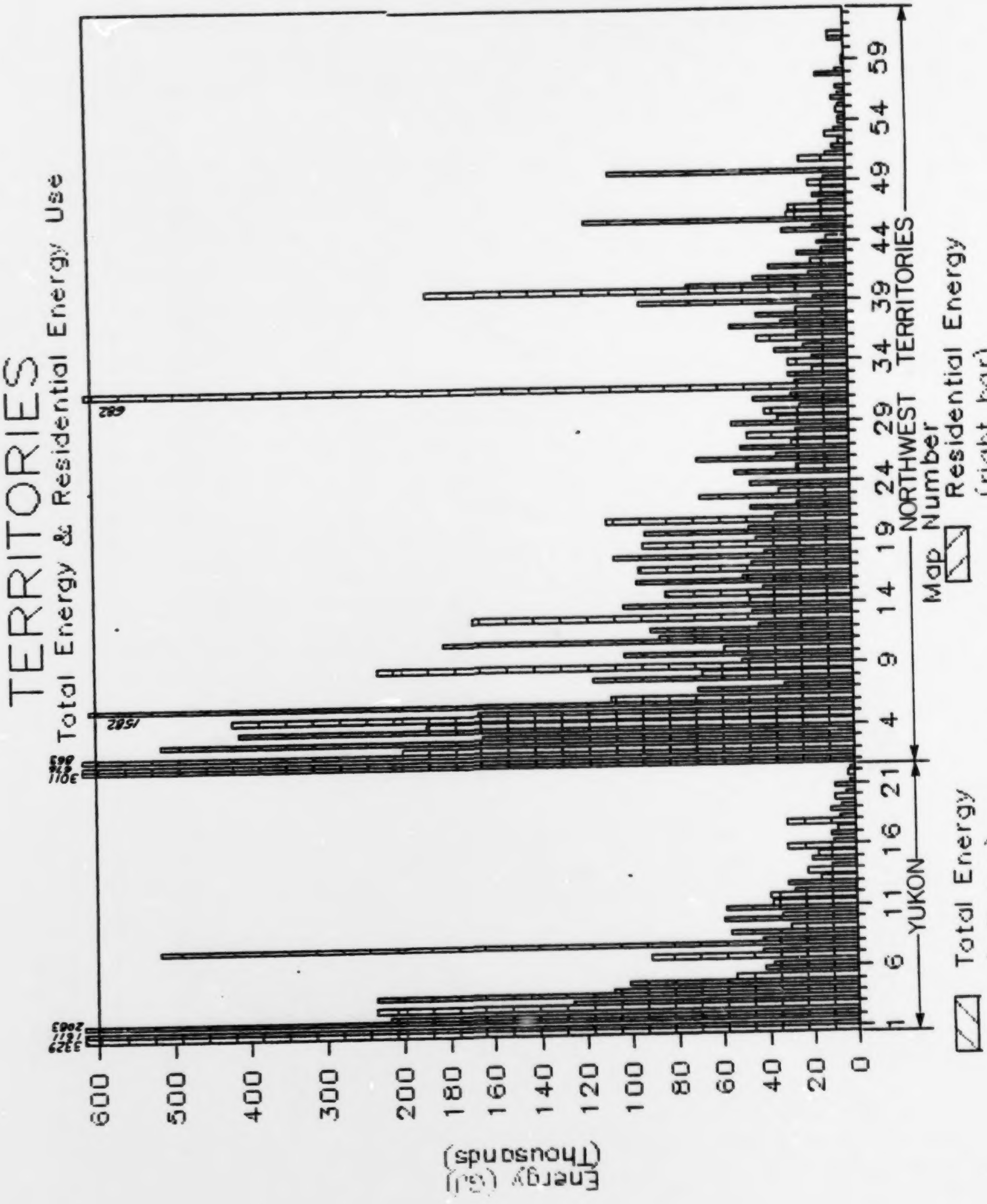

BRITISH COLUMBIA
Total Non-renewable Energy Use & Potential Energy Savings
853
1855
570
771
626
Energy (GJ)
(Thousands)
500
400
300
200
100
0
1
11
21
31
41
51
61
71
81
91
Map Number
Total Non-renewable
(left bar)
Potential Savings
(right bar)

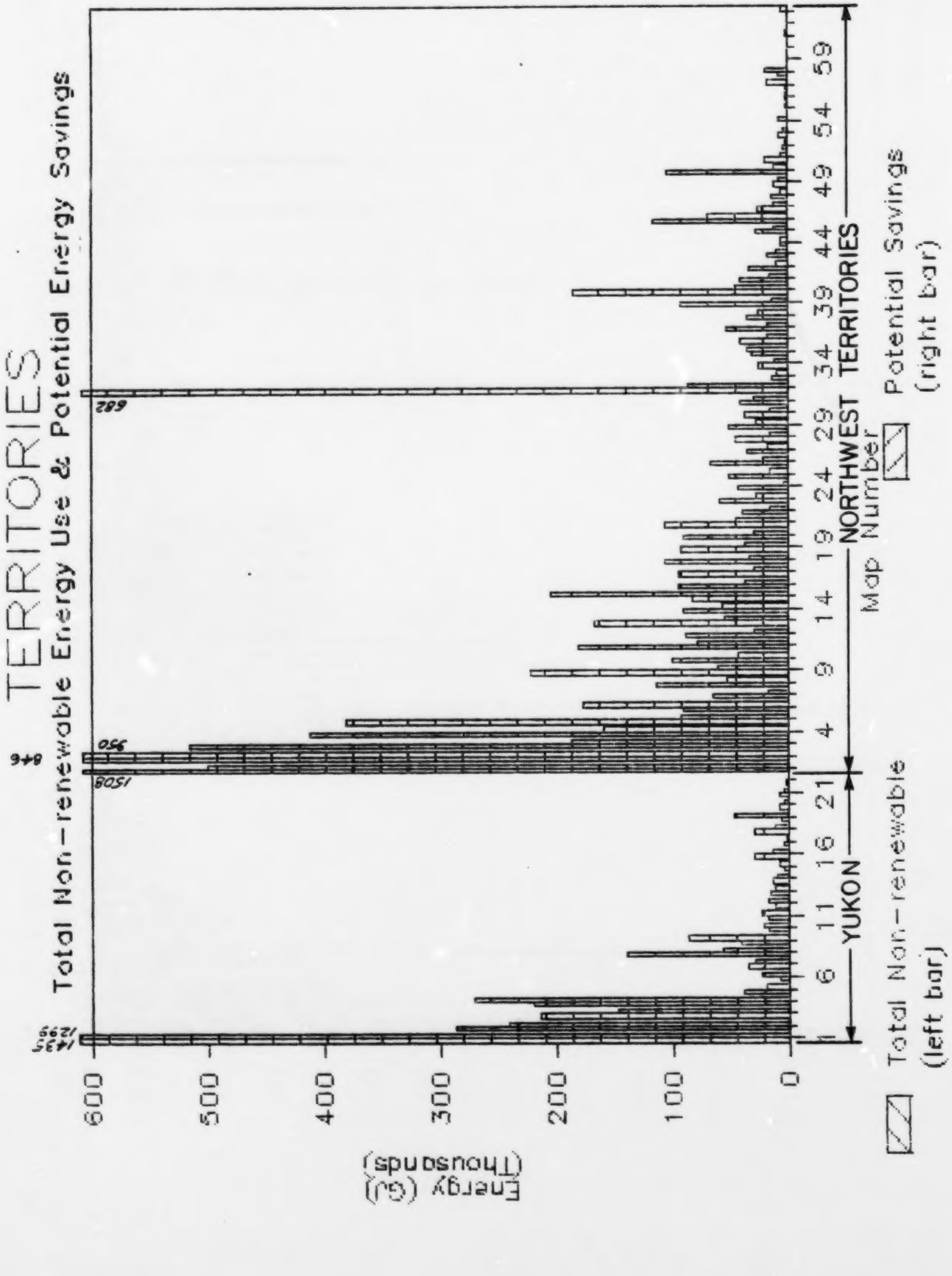
BRITISH COLUMBIA

Per Capita Energy & Oil Use



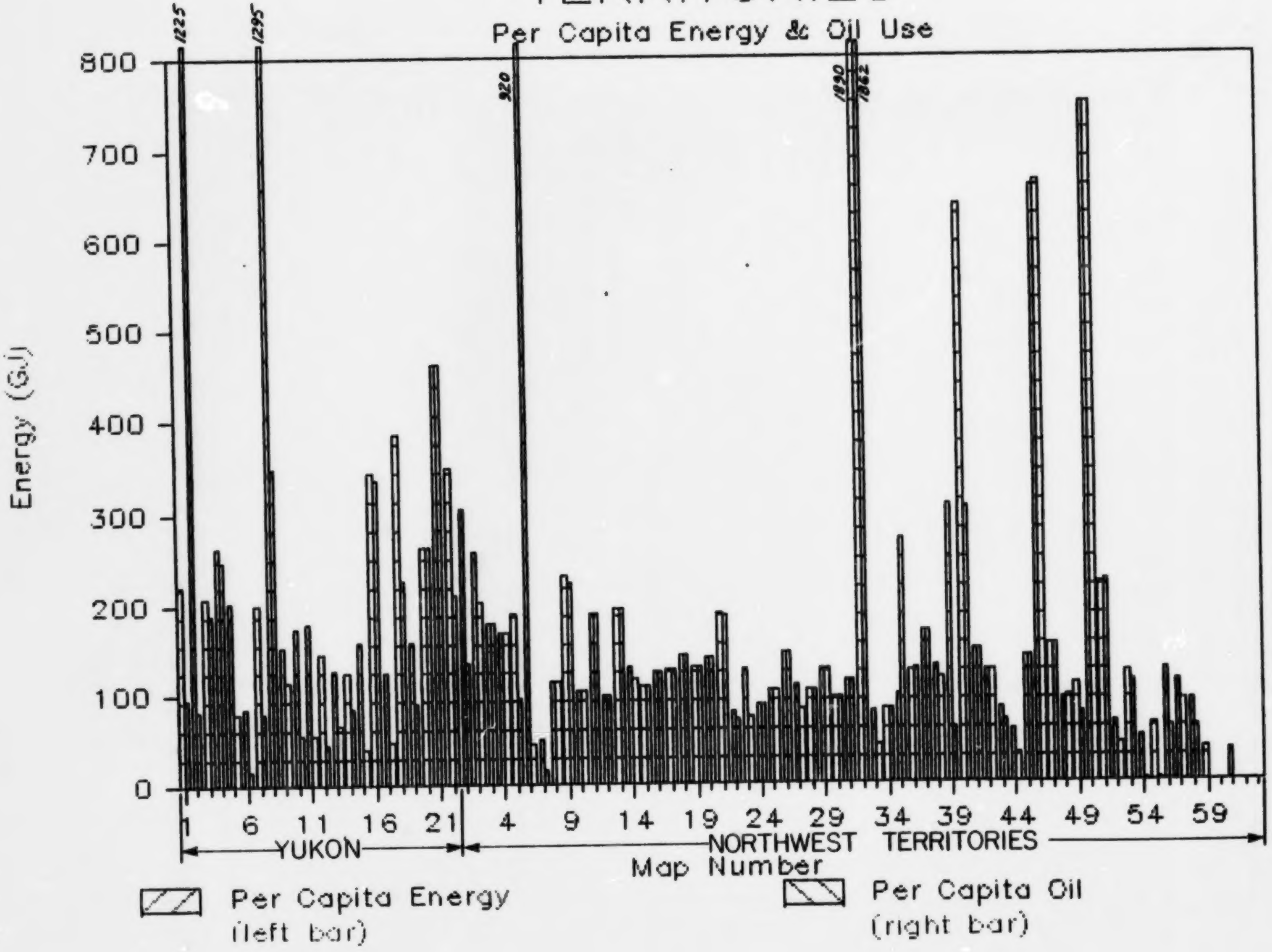

BRITISH COLUMBIA
Total Electricity &. Residential Electricity Use
557
358
Energy (GJ)
(Thousands)
200
100
50
40
30
20
10
0
1
11
21
31
41
51
61
71
81
91
Map Number
Total Electricity
(left bar)
Residential Elect.
(right bar)


TERRITORIES
Total Energy & Residential Energy Use
Energy (GJ)
(Thousands)
600
500
400
300
200
180
160
140
120
100
80
60
40
20
0
3329
1131
2063
3011
663
1582
682
1
6
11
16
21
YUKON
4
9
14
19
24
29
34
39
44
49
54
59
NORTHWEST TERRITORIES
Map Number
Total Energy
(left bar)
Residential Energy
(right bar)



TERRITORIES

Total Non-renewable Energy Use & Potential Energy Savings

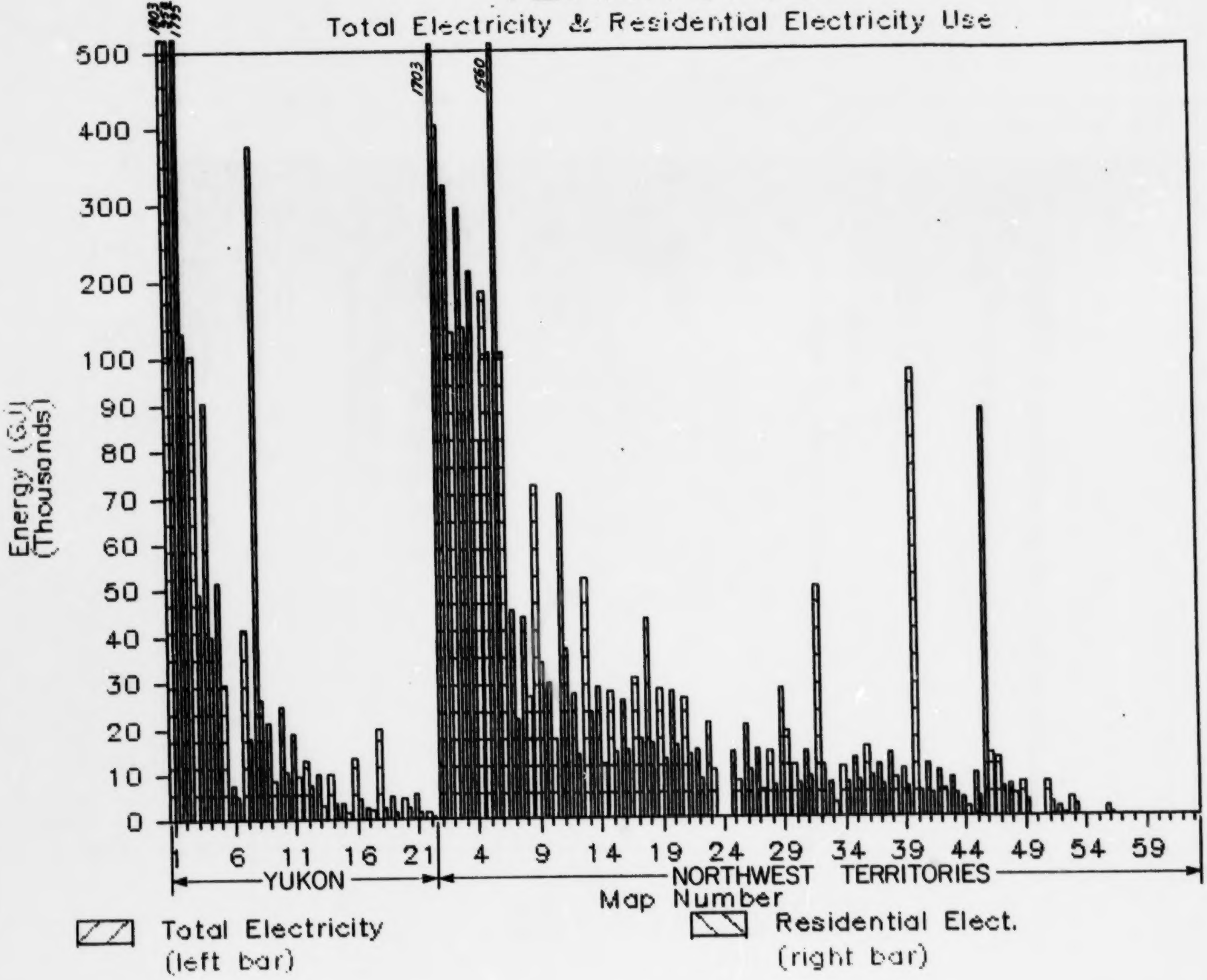


TERRITORIES

Per Capita Energy & Oil Use

TERRITORIES

Total Electricity & Residential Electricity Use



APPENDIX 1

DESCRIPTION OF DATABASE PACKAGE

1. SELECTION OF THE SYSTEM

1.1 REQUIREMENTS OF THE STUDY

The requirements of the Energy Overview of Canada's Remote Communities were set out in the Scope of Work and restated in Section 1.1. In terms of these requirements translated into database selection criteria, the scope of work became a list of features and ranges which would have to be satisfied by the database package. These features consisted of:

Size: The data base would have to contain between 350 and 400 communities, each with about 50 categories of basic data and about 20 categories of derived data. Therefore up to 28,000 data locations would be stored, and additional storage would be required for the equations used to derive baseline data.

Data Descriptions: Data would be numerical and descriptive. Categories would not always be filled in.

Flexibility: After the data has been entered, provision must be made for future updating as new information became available (usually on an annual basis). The package also has to be able to produce results based on contemplated changes in government policy, so that the effects on the remote communities can be evaluated before the policy becomes effective.

Simplicity: The package should be easy to use and adaptable without the need of advanced computer training.

Capability: The package should be capable of adding categories to produce summaries and some additional mathematical capability would be helpful.

1.2 THE RBASE PACKAGE

The database system selected for the Energy Overview of Canada's Remote Communities is RBase. RBase is a relational database management system which allows many categories of data related to a common item (ie. a community) to be catalogued, organised, sorted and added. Although there are several database packages on the market, RBase was selected because of its simplicity to use, large storage capability and relatively low cost.

With RBase, the user can enter and edit data on a common form, produce a summary report of each community, summarize data by category and by region, and sort certain categories of data. These features are all required to provided the information outlined in items 1, 3, 4, 5, 6 of Section 1.1 of the report.

RBase does have its limitations, one of those being an ability to do complex mathematical relations. For this requirement, a spreadsheet format is required and once again many packages exist. RBase permits loading of selected data into the spreadsheet and the spreadsheet package can perform several mathematical functions on the entered data. In this overview the categories requiring the spreadsheet capacity are the Annual Potential Energy and the Projected Consumption. The Annual Potential Energy section has some data calculated from earlier entries while some is entered directly. The Projected Consumption uses the Annual Potential Energy plus earlier data entries. About 12 data categories are required from the RBase Package to set the spreadsheet and an additional 15 categories are then calculated. Regional summaries are provided. Further discussion of the spreadsheet is provided in Section 2.3 of this Appendix.

The spreadsheet package selected was Lotus 1-2-3. The primary advantage of this package is its graphics capability and storage capacity. In the Energy Overview bar graphs of selected energy categories in the spreadsheet can be produced by Lotus 1-2-3, allowing a rapid visual comparison of energy categories amongst communities of comparable size in the same region.

1.3 EQUIPMENT REQUIREMENTS

The computer hardware required to maintain the database in future years consists of an IBM-PC computer or compatible MS-DOS system with built-in memory of at least 250 K. The computer should be equippped with twin disc drives or a disc drive and hard disc combination. The system also needs a monochrome display monitor and a printer, preferably an Epson. In order to display and print graphs, which is optional, the computer will have to be properly equipped, however most computers now sold have this capability. Instructions on the operation of the equipment and the software packages is contained in Appendix 2 of this report.

2. SYSTEM DESIGN WITHIN THE DATABASE

2.1 INPUT AND OUTPUT

The use of a database package is only the first step of the program, for once the package is selected it still must be customized to suit the requirements of the user. This can be done in any number of ways which are consistent with the rules of the database package.

An input form was first designed which would be used for each community in the overview. The form contained enough numerical entries to answer all of the objectives in the scope of work. Even if the information is not presently available in some communities, it will be possible to add it in and summarize it if the information is available in the future. In a similar manner existing information can be updated. Other information on communities is descriptive. This only appears with the community information (not summarized) and is usually used to explain an anomaly with the data or describe what the alternative energy sources may be. An example of a blank input form is shown on Figure 1 while the output results are shown in Appendix 4.

2.2 SUMMARY SHEETS

The community data described in Section 2.1 is little more than the existing community data contained within the regional overviews condensed into a uniform format. All of the derivations within each community form can be performed manually within a reasonable time. However, the sheer volume of the calculations for the entire database would make the task time consuming to perform manually, with an increased risk of errors. On the database, once one set of calculations is verified, they will all be performed in the same manner.

The area where the database is clearly superior is in the production of data summaries. These consist of important community energy data, (e.g. total community oil use) presented with all communities together. The database package computes the desired information (if required) then lists information of the same category together by region, then adds the columns to arrive at regional totals. The regional totals are then added to form the national total. With about 12 categories and 350 - 400 communities, the task of providing and updating the list becomes difficult to deal with. An example of a provincial summary is presented as Figure 2.

2.3 SPREADSHEET

A few of the requirements and reasons for a spreadsheet have been described in Section 1.2. In this Section, the workings of the spreadsheet are described in detail, using the Lotus 1-2-3 package.

A sample of part of the spreadsheet is shown in Figure 3. This shows all of the categories, but the entire list of communities is not presented, but is instead shown in Appendix 4.

The main purpose of the spreadsheet is to be able to perform numerical calculations and subsequently graph the results. The categories to be calculated are Annual Potential Energy and Projected Consumption (see Figure 1). These results are based on the following inputs:

Population

Construction Quality

Number of Residences

Oil use for heat (total and residential)

Electricity use (total and residential)

Wood Energy

Population Growth Factor

Total Energy

Other required inputs for graphing only include:

Residential Energy Total

Per Capita and Per Household Averages for
Electricity, Oil, Energy

Cost information

Community Energy Total

The data is combined as described in Section 2.4 following:

2.4 SPREADSHEET EQUATIONS AND DATABASE ASSUMPTIONS

The quantities derived in the spreadsheet require some assumptions to be made regarding both the input data and the way they are combined. This is necessary because insufficient data at the community level often exists so a reasonable estimate must be made of some energy categories. A discussion at this point permits adaptation of the equations should more reasonable data or methods be found in the future.

2.4.1 Annual Potential Energy

Insulation Potential: Based on a relative heat input of 1.0/1.7/3.0 for Good/Fair/Poor housing respectively and based on the number of homes in each category and the existing total residential heat, the insulation potential is shown assuming the good homes remain, fair homes are upgraded to good and poor homes are upgraded to fair. Approximate wall/ceiling ratings of each category are Good R12/R28, Fair R7/R12 and Poor R0/R0. It is assumed that future population growth is accommodated in new housing built to the Good rating. What is not certain is the various interpretations provided for each community, as many communities with houses of "good" construction may not have well insulated houses.

Waste Heat Potential: Waste heat is taken as 35% of the diesel generation fuel input for electricity for the year in question. It is assumed that this heat is all usable by a community building, now or in future.

Management Potential: Management consists of utilizing energy effectively without major capital construction. Management techniques consits of: heating only the zones of a building which are occupied, thermostat set backs, conservation by downsizing lights and turning off lights when not in use, sizing generators to match the load and similar techniques. It is set at 10% of the present Total Energy, now and in future.

Hydro: The hydro potential is based on the community hydro assessment, where available and where economic. The hydro resource is provided in GJ of oil equivalent to that saved in diesel electrical generation. Grid connections are also included in this category where applicable.

Wind: Few communities have had a direct assessment of wind potential but where an overview suggests wind may have potential, it will be included on the basis of providing up to 25% of the demand for electricity.

Solar: Solar energy is technically feasible in most areas but not cost effective unless diesel generated electricity is used for heating. In the British Columbia overview study, solar was assumed to provide 50% of residential water heat in some areas, but as solar was not evaluated in most regions, we will leave this space blank. In future, information could be inserted, or another heading title made for an as yet unknown technology.

Wood: Many communities already use wood for residential space heating needs and a few use wood for community buildings. Where there is a good potential in the region for wood, it is assumed that the potential is represented by all residences switching to wood. Where potential is limited, it is assumed that only the existing wood users continue to heat with wood. In some communities, there is no existing use of wood due to lack of supply, so this status is maintained.

2.4.2 Projected Consumption

Energy use in 1992, 2002 (with Status Quo).

Total Energy in future years is scaled up by the projected population increase factor. This factor is applied directly to residential electricity use (which is proportional to numbers of households) but the remaining community is expected to grow in energy use at a slower rate, represented by the presence of existing infrastructure and the probability of constructing new residences to higher standards. Therefore all community energy (except residential electricity) is expected to grow by a ratio equal to the total residential energy (with additional homes in the Good category) relative to the existing residential energy.

Oil use in 1992, 2002 (with Status Quo)

It is assumed that oil use in future years maintains its relative share of total community energy. The exception lies where the availability of wood is limited. In such communities it is assumed the oil use increases while the community's use of wood remains fixed.

Total Energy Use with Alternatives in 1992, 2002

Only a few of the energy alternative categories will actually save on the total energy use. By assuming that growth in energy use occurs in newer buildings as described above, the potential energy savings lie in the insulation potential of existing homes. Additional savings come from deducting the waste heat potential of future electrical generation and the existing energy management potential. Other sources of energy affect the amount of oil used but not the total energy, as detailed below.

Oil use with Alternatives in 1992, 2002

Future oil with alternative energy sources depends greatly on the community's availability of resources, particularly small hydro, grid hydro and wood. In these categories it is assumed that the preceding amounts of insulation, waste heat use and management are applied to future energy use, any of the viable hydro, wind and other resources are utilized and that wood is used up to the limit of the local resource applied to residential space heating. If the oil total is zero, which can only occur under these definitions if there is a complete replacement of electrical generation with a renewable resource and replacement of all oil heating, the community has a potential surplus of renewable energy.

2.4.3 Additional Assumptions

Some of the baseline data presented have assumptions attached when manipulations are done. Although these are minor, they are listed here to assist with the understanding of the results.

Energy Use; General: All sources of energy are converted to gigajoules of energy before burning. The following conversion factors are used:

Oil:	1 GJ = 25.8 litres
Wood:	16 GJ/cord (stacked)
Propane:	.0272 GJ/l
	.0242 GJ/lb
Electricity:	converted to oil through the applicable generator efficiency, then to GJ
Other sources:	Usually these are electricity replacements and they are converted at the rate of 3.0 kW.h/litre of oil (an average efficiency)

Electricity (Heat): Electricity used for space heat is assumed to be used in very well insulated buildings.

Commercial, Community and Industrial: These categories, where known separately, are filled in. Where they are not identified the non-residential sector is combined under the Community heading.

Fuel Prices at the Community: Reported prices are used where possible. Electricity price is based on utility tariffs and residential usage to the stated levels including flat rates and trailing rates. The price of wood is sometimes reported but just as often it is reported as free.

Percent of buildings well insulated: Where the number of CHIP grants is known, the percentage is shown in this category.

Energy Use Summary:

Total Electricity is the electricity (non heat) plus electric space heat.

Total Renewable is Wood (GJ) + Others (GJ).

Total nonrenewable is oil + propane + diesel electricity.

Total Energy is total electricity + oil + propane + wood + others.

If anomalies exist, these are shown under the "Remarks" section.

Electricity demand per capita: this is based on the entire population and the entire community energy.

Electricity demand per household: this is based on residential electricity.

Per capita oil consumption and per capita energy consumption are based on community totals.

Total cost of oil consumed aggregates heating fuel and electricity at their respective prices.

In several instances a breakdown between residential and non residential electricity and space heat use is not provided. When this occurs, a ratio can be set up based on similar communities within the region or other regions where information is available. Alternatively, if the electricity is provided but not the space heat, the same ratio can be used. At this level of study the above technique has not been done so as to clearly indicate where improved information is needed.

Community name: Province:
District: Map no.: Latitude/longitude:
Degree days: Population: Seasonal variation:
Three main economic activities:
Population growth factors: 10 year: 20 year:

Number of buildings:	Residential	Commercial	Community	Industrial

Construction quality: Good: % Fair: % Poor: %

Energy Use (oil equivalent,GJ):

	Elect. (non-heat)	Elect. (heat)	Oil	Propane	Wood	Other ( )
Residential						
Commercial						
Community						
Industrial						
Total						

Diesel generator information: Size: kw Owner:
Percent of community's needs met by generator: %
Hours/day: Average power: kw
Annual energy: mwh Fuel/year: cu.m.
Fuel prices: $ /l Maintenance cost/year: $
Efficiency: kwh/l Average/peak load: %

Fuel prices at community (as of)

Heating: oil,$/l	Electricity ($) 250kwh	500kwh	750kwh	Propane $/100lb.	Diesel $/l	Gasoline $/l	Wood $/cord	Other

Fuel used for transportation: GJ
Average household energy bill per year: $
Plans to change energy supply situation:
Other possible energy alternatives:
Percent of buildings well-insulated: %
Remarks:

Energy Use(GJ):	Total Electricity	Total Renewable	Total Non-renewable	Total Energy
Residential				
Commercial				
Community				
Industrial				
Totals:				

Electricity demand: Per capita: GJ Per household: GJ
Per capita energy use: GJ Per capita oil consumption: GJ
Total cost of oil consumed: (in $1000)

Annual potential energy (GJ) :

Insulation	Waste Heat	Management	Hydro	Wind	Solar	Wood

Projected consumption: (GJ)	Energy in 1992	Energy in 2002	Oil in 1992	Oil in 2002
With status quo:				
With alternatives:				

FIGURE 1

```
Energy and Electricity Summary for: Saskatchewan
------------------------------------

:      Community Name          :  Total    :Residential: Per Capita :Per Household: Per Capita:
:                              :  Energy   : Energy Use: Energy Use :  Elec. Use  :  Elec Use :
:------------------------------:-----------:-----------:------------:-------------:-----------:
:Black Lake                    :  34065.0:   19427.0 :   47.3125  :   66.4796   :  17.3819 :
:Brabant                       :  9153.00:   4779.00 :   70.9535  :   70.0385   :  33.2326 :
:Camsell Portage               :  8608.00:   3986.00 :   141.115  :   73.5000   :  76.5082 :
:Deschambault                  :  32915.0:   14364.0 :   63.6654  :   63.5366   :  29.9168 :
:Fond du Lac                   :  57303.0:   17312.0 :   106.117  :   74.7312   :  26.8185 :
:Garson Lake                   :  4905.00:   2788.00 :   58.3929  :   0.00000   :  19.3452 :
:Kinoosao                      :  7874.00:   4943.00 :   97.2099  :   112.000   :  45.4815 :
:Southend                      :  29593.0:   13194.0 :   56.0473  :   93.7800   :  27.4205 :
:Stony Rapids                  :  47670.0:   19508.0 :   191.446  :   165.469   :  56.5502 :
:Wollaston                     :  35908.0:   18476.0 :   66.1289  :   73.1868   :  28.8674 :
:------------------------------:-----------:-----------:------------:-------------:-----------:
:Sum or Average                :  267994.:   118777.:     77.6344:     77.6948:    29.2471:
```

```
Oil consumption summary for : Saskatchewan
-----------------------------

:      Community name          : Oil Used for : Oil Used for : Per Capita Oil: Total Cost of :
:                              : Electricity  : Space Heating:  Consumption  : Oil Consumed  :
:                              :    (GJ)      :    (GJ)      :     (GJ)      :     ($)       :
:------------------------------:--------------:--------------:---------------:---------------:
:Black Lake                    :     11154.0 :    8242.00   :    26.9389    :   173343.     :
:Brabant                       :     4379.70 :    1548.00   :    45.9512    :   45091.5     :
:Camsell Portage               :     2691.00 :    1781.00   :    73.3115    :   34411.9     :
:Deschambault                  :     13306.8 :    8012.00   :    41.2356    :   167455.     :
:Fond du Lac                   :     11793.6 :    22253.0   :    63.0493    :   297940.     :
:Garson Lake                   :     0.00000 :    0.00000   :    0.00000    :   0.00000     :
:Kinoosao                      :     3507.66 :    1742.00   :    64.8106    :   47024.1     :
:Southend                      :     10767.9 :    7315.00   :    34.2479    :   149026.     :
:Stony Rapids                  :     13115.7 :    23375.0   :    146.549    :   322202.     :
:Wollaston                     :     13537.7 :    9908.00   :    43.1781    :   200263.     :
:------------------------------:--------------:--------------:---------------:---------------:
: Total or Avg.                :     84254.0 :      84176.0 :      48.7920 :    .143676E7 :
```

FIGURE 2

name	Map No	Province	Pop'n	%Good	%Fair	%Poor	ResiElWH	ResiElH	ResiOil	ResiPro	ResiWd	ElecHt	OilHeat	ProHeat	WdHeat	ResiEngy	ElecTot	NonRTot	EngyTot
Brochet	9	Manitoba	640	0	100	0	4649		0	0	18202	0	11224	128	18723	22846	14508	25860	44583
Garden Hill	2	Manitoba	1800	0	100	0	20237		0	0	63642	0	24228	150	65680	83879	44725	69103	134783
God's Lake Narrows	4	Manitoba	1250	0	100	0	11327		0	0	39105	0	16137	122	40164	50432	26181	42440	82604
God's River	12	Manitoba	250	0	100	0	3398		0	0	10286	0	2593	65	10824	13689	7231	9889	20713
Granville Lake	16	Manitoba	140	0	100	0	710		0	0	2259	0	890	30	3018	2969	1743	2663	5681
Lac Brochet	11	Manitoba	380	0	100	0	968		0	0	5767	0	3637	158	6305	6735	3224	9019	15324
Oxford House	5	Manitoba	1250	0	100	0	10430		0	0	45583	0	15711	0	46610	56013	23027	30738	85348
Pikwitonei	13	Manitoba	203	0	100	0	3382		0	0	10033	0	4798	52	10302	13415	6692	11542	21044
Pukatawagan	6	Manitoba	1100	0	100	0	5983		0	0	20824	0	7818	163	21330.	26807	18935	26916	48246
Red Sucker Lake	10	Manitoba	425	0	100	0	4093		0	0	13825	0	5457	76	14094	17918	8217	13750	27844
St. Theresa Point	3	Manitoba	1450	0	100	0	14979		0	0	45867	0	16525	114	46815	60846	28782	45421	92236
Shamattawa	8	Manitoba	680	0	100	0	4269		0	0	19055	0	6308	169	19766	23264	9726	16203	35969
Tadoule Lake	14	Manitoba	215	0	100	0	1161		0	0	7631	0	2671	190	8089	8792	3734	6595	14684
Thicket Portage	15	Manitoba	200	0	100	0	2541		0	0	8974	0	5728	92	9638	11515	6645	12465	22103
Wasagamach	7	Manitoba	730	0	100	0	6506		0	0	21377	0	10991	98	22088	27883	17384	28473	50561
Churchill	1	Manitoba	1600	0	100	0	119836		4064	0	0	0	119661	16619	0	123900	307778	444058	444058

Engy/Cap	Oil/Cap	GF1992	GF2002	HydroPot	WindPot	SolarPot	Fuel/Yr	K	ResiHeat	InsulPot	WastePot	ManagPot	WoodPot	Engy1992	Engy2002	Oil1992	Oil2002	Eny92Alt	Eny02Alt	Oil92Alt	Oil02Alt
69.6609	40.45	1.22	1.49	230000	0	0	376	0.588235	18202	7494.9	5092.9	4458.3	0.0	50773.3	58370.4	29450.6	33857.3	33727.1	41324.2	-211025.4	-206618.8
74.8795	38.55	1.17	1.38	257000	0	0	1158	0.588235	63642	26205.5	15685.1	13478.3	0.0	149677.9	168077.5	76739.6	86173.0	94309.0	112708.5	-209905.8	-200472.4
66.0832	34.0632	1.29	1.66	180000	0	0	678	0.588235	39105	16102.1	9183.5	8260.4	0.0	98047.8	117752.1	50374.7	60498.3	64501.9	84206.1	-147658.0	-137534.5
82.852	39.544	1.22	1.48	386000	0	0	187	0.588235	10286	4235.4	2532.9	2071.3	0.0	23701.3	27233.0	11315.7	13001.8	14861.7	18393.4	-379020.7	-377334.6
40.5786	18.8929	1.5	2.25	340000	0	0	45	0.588235	2259	930.2	609.5	568.1	0.0	7498.1	10223.6	3514.8	4792.4	5390.3	8115.8	-297571.3	-296293.7
40.3263	23.4263	1.22	1.49	230000	0	0	135	0.588235	5767	2374.6	1828.6	1532.4	0.0	17394.8	19936.2	10237.8	11733.5	11659.2	14200.6	-223347.8	-221852.0
68.2784	31.164	1.38	1.91	50000	0	0	596	0.588235	45583	18769.5	8072.8	8534.8	0.0	106057.8	134942.5	48137.8	61248.1	70680.7	99565.4	-18540.6	-5430.3
107.606	56.8719	1.22	1.49	6400	0	0	173	0.588235	10033	4131.2	2343.3	2184.4	0.0	24977.2	28822.6	13197.6	15229.4	16318.3	20163.7	1991.9	4023.7
43.86	24.48	1.27	1.61	300000	0	0	490	0.588235	20824	8574.6	6637.1	4824.6	0.0	56573.8	67060.6	31562.0	37412.5	36537.5	47024.4	-280033.7	-274203.2
65.5153	32.3859	1.54	2.39	40000	0	0	213	0.588235	13825	5692.6	2885.1	2784.4	0.0	37598.7	52953.2	18567.1	26149.5	26236.5	41591.1	-27275.8	-19693.3
63.611	31.4345	1.78	1.64	65000	0	0	745	0.588235	45867	18886.4	10091.0	9223.6	0.0	109154.8	130907.5	53752.6	64464.5	70953.8	92706.5	-30799.1	-20087.1
52.8956	23.7294	1.49	2.21	0	0	0	252	0.588235	19055	7846.2	3413.3	3596.9	0.0	47185.8	63667.5	21255.8-	28680.4	32329.3	48811.1	14336.2	21760.8
68.2977	30.0186	1.27	1.49	26000	0	0	97	0.588235	7631	3142.2	1313.9	1468.4	0.0	16689.5	19150.7	7495.7	8601.1	10765.0	13226.3	-21244.1	-20130.7
110.515	62.18	1	1	0	0	0	172	0.588235	8974	3695.2	2329.7	2210.3	0.0	22103.0	22103.0	12465.0	12465.0	13867.8	13867.8	7519.5	7519.5
69.2616	39.0973	1.54	2.36	65000	0	0	450	0.588235	21377	8802.3	6095.3	5056.1	0.0	60068.2	94653.2	38332.0	53303.1	48114.5	74699.5	-38526.6	-23555.9
277.536	269.081	1	1	427439	0	0	7971	0.588235	4064	1673.4	107967.2	44405.8	0.0	444058.0	444058.0	444058.0	444058.0	290011.6	290011.6	-138896.8	-138896.8

TYPICAL SPREADSHEET

FIGURE 3

APPENDIX 2

ANALYSIS OF SELECTED COMMUNITIES

APPENDIX 2

ANALYSIS OF SELECTED COMMUNITIES

1. INTRODUCTION

As described in the report and presented in Appendix 4, all of the Remote Communities in Canada have been analysed in a computerized database program. In this appendix, a representative sample of communities has been analysed based on manual interpretation of the data. This serves to check the computer input and output as well as indicate the relative availability of community data in each region. By providing comments relevant to the community the analysis routine appropriate to all the communities of each region is indicated.

2. COMMUNITY SELECTION

Although remote communities are anything but typical when the entire country is examined, there are some patterns when a regional viewpoint is used. Accordingly, for each region of the country a community of moderate population was examined in the belief that it represented both the type of community and the degree of information available. The results of the analysis should then be typical of what may be expected in similar communities in the corresponding region.

The following communities are described:

Newfoundland	Labrador	Cartwright
	North	Main Brook
	Central	Change Islands
	South	Ramea
Quebec	Nouveau	Inukjuak
	Central	Obedjiwan
	Lower North Shore	Harrington Harbour
	Magdalen Islands	Havre aux Maisons
Ontario	Native Coastal	Attawapiskat
	Native Interior	Deer Lake
	Railway	Ramsey
Manitoba	Native	Oxford House
	Industrial	Churchill
Saskatchewan		Deschambault
Alberta		Jean d'Or Prairie
British Columbia	Utility	Bella Bella
	Forestry	Greenwood
	Independent	Trout Lake
Yukon		Dawson City
Northwest Territories	Baffin	Igloolik
	Keewatin	Rankin Inlet
	MacKenzie	Fort Providence

COMMUNITY: CARTWRIGHT **CATEGORY:** LABRADOR **POPULATION:** 658

Buildings: **Residential:** 165 - 9% very good, 32% good, 36% fair, 23% poor

Community: 3 churches, hall, library, recreation centre, coastguard, clinic (433 m^2) 12 room school, RCMP

Commercial: 10 assorted stores

Residential Heating: 90 stoves or space heating, 40 wood, 35 unknown
Degree Days: 6500

Transportation: Local use of cars, no roads out

Power Generation: 850 kW plant uses 566000 L @ 0.39¢/L
Demand: 1,516,000 kWh **Peak Load:** 378

Resources: Small Hydro has potential but other resources not known

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	830832	2991	12128	22363		34491
Others:	445210	1603	N/A	N/A		

Derived Data

Building Heating:
Avg Residential Heat = 209 GJ
Cost using oil @ $.39/l = $2,145 /yr
Cost using wood @ $80/cord = $1,045 /yr

Comments: Based on table above 31% of homes heat with wood, but 65% is also reported. Different heating efficiencies could result in cost variations (typical of all communities).

Suspected Inconsistencies: Residential heating use seems high, but this may be due to some commercial use not accounted for. Nonresidential heat not provided. Actual Electricity use as oil equivalent = 21900 GJ.

Transportation: Transportation energy not provided. Residential use low, but commercial use high due to fishery.

Power Generation: Demand: 1516000 Actual Use: 1276000
Distribution Loss: 19% Efficiency: 2.69 kWh/l

Average Plant Load: 173 **Peak Load:** 378
Load Factor 0.46 **Average Residential Load:** 5035 kWh/yr

Conservation and Renewable Energy Alternatives:
There is a nearby small hydro site with good potential. The diesel plant is moderately efficient, but distribution losses could be checked. There appears to be potential to expand the use of wood for space heating, provided local roads extend far enough. The 6500 Degree Day zone means that investment in conservation and insulation measures would be attractive. The houses described as very good may be well built but not well insulated.

COMMUNITY: CHANGE ISLANDS **CATEGORY:** CENTRAL **POPULATION:** 580

Buildings:	**Residential:**	165 - 95% very good, 60 minor repairs, 15 major repairs
	Community:	46.5 m^2 Clinic 10 Room School
	Commercial:	Fish Plant, Bait Depot, Post Office, Church

Residential Heating:
Degree Days: 4900

15	Steam/Hot Water
20	Hot Air
125	Stove
5	Wood

Transportation: Area reached by ferry. Boats and cars used locally

Power Generation: 475,000 L @ .32/L
Demand: 1565 MWh **Peak Load:** 420 kW

Resources: Waste heat for church, limited wood
Conservation not evaluated

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	972739	3502	14029	11954		25983
Others:	410619	1479	N/A	N/A	N/A	N/A

Derived Data

Building Heating:

Avg Residential Heat = 157 GJ/yr
Cost using oil @ $.32/l = $1,322 /yr
Cost using wood @ $80/cord = $785 /yr

Comments: Heat use proportional to Cartwright, considering degree days.

Suspected Inconsistencies: No heat stated for nonresidential sector. Proration wuld be required. Actual electricity use as oil equivalent =18417 GJ

Transportation: Local car use limited, fishery would be a major user

Power Generation: Demand: 1,565,000 Actual Use: 1,383,000
Distribution Loss: 13% Efficiency: 3.29 kWh/l

Average Plant Load: 178 kW **Peak Load:** 420
Load Factor .425 **Average Residential Load:** 5895 kWh/yr

Conservation and Renewable Energy Alternatives:
Limited wood resource, no small hydro resource, but the coastal location may have wind potential. Diesel is efficient.

Wood resource could be extended by adopting more efficient heaters and upgrading insulation. Similar savings in oil use would result.

Examine the waste heat potential to heat the church and other buildings, if the diesel continues to be the best source of power generation.

Mention is made of the possibility of grid connection. This should be evaluated.

COMMUNITY: MAIN BROOK **CATEGORY:** NORTH **POPULATION:** 514

Buildings: **Residential:** 125 - 40 very good, 35 minor repair, 40 major repair, 10 unknown

Community: 2 Schools (5 rooms each), Others: N/A

Commercial: Not Available

Residential Heating:
Degree Days: 6000

35	Hot Air
70	Stoves
15	Other (assume wood)

Transportation: N/A but likely boats and local vehicles used

Power Generation: 832 kW plant uses 371000 L @ $0.29
Demand: 1,054,000 kWh **Peak Load:** 336 kW

Resources: Wood and peat have potential, but not fully evaluated. Wind resource not catalogued.

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	799942	2880	12091	7910		20001
Others:	150667	542	N/A	N/A		N/A

Derived Data

Building Heating:

Avg Residential Heat = 160 GJ/yr
Cost using oil @ $.29/l = $1,221 /yr
Cost using wood @ $80/cord = $800 /yr

Comments: Table indicates 12% of homes heat with wood, but 40% is also reported. The heating use is moderate considering the degree days.

Suspected Inconsistencies: Not enough information is provided about housing quality to do an adequate analysis. Commercial energy use is considered to be low. Actual electricity use as oil equivalent - 14383 GJ.

Transportation: N/A, but boats for fishing and local cars are likely. There is road access to the rest of Newfoundland.

Power Generation: Demand: 1054000 Actual Use: 950609
Distribution Loss: 10% Efficiency: 2.84 kWh/l

Average Plant Load: 120 kW **Peak Load:** 336
Load Factor .358 **Average Residential Load:** 6399 kWh/yr.

Conservation and Renewable Energy Alternatives:
Residential Energy use is somewhat higher than other areas, while commercial use is lower, indicating there may be some combining of commercial and residential loads.

Wood and peat resources could be examined further, but residential insulation could also be checked as a means of saving both wood and oil.

The diesel generation is relatively efficient and the distribution loss is acceptable, despite the relatively low load factor. The combination of generators available means that efficiencies can be maintained through a range of loads. Examination of reasons for the high peak load should be done.

COMMUNITY: RAMEA **CATEGORY:** SOUTH **POPULATION:** 1386

Buildings:

Residential: 330 - 250 very good, 45 minor repair, 35 major repair
Community: N/A, but evidence shows 2 schools
Commercial: N/A, but evidence shows a fish plant and supermarket

Residential Heating:
Degree Days: 4900

30	Hot Water
110	Hot Air
170	Space Heater
5	Wood
15	Unknown

Transportation: Area served by ferry with local cars

Power Generation: 3036 kW plant uses 1,673,000 L @ $0.37
Demand: 6276000 kWh **Peak Load:** 1650 kW
Resources: None noted
Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	2445000	8805	42790	1407		44197
Others:	3187000	11471	N/A	N/A		N/A

Derived Data

Building Heating:

Avg Residential Heat = 134 GJ/yr
Cost using oil @ $.37/l = $1304 /yr
Cost using wood @ $80/cord = $670 /yr

Comments: Residential heat is proportional to other communities in Newfoundland, considering degree days. The use of wood is consistent from both noted references.

Suspected Inconsistencies: Commercial/industrial electricity is high, owing to fish plant and possibly other uses not stated.

Transportation: Ferry service to main island, local cars and boats likely used.

Power Generation: Demand: 6276000 Actual Use: 5632224
Distribution Loss: 10% Efficiency: 3.75 kWh/l

Average Plant Load: 716 kW **Peak Load:** 1650
Load Factor .43 **Average Residential Load:** 7409 kWh/yr.

Conservation and Renewable Energy Alternatives:

The diesel plant is very efficient, and distribution loss is low, leaving little room for improvement. Load factor is a bit low considering the industrial base, suggesting a more seasonal industry. Peak load is high on a per capita basis, reflecting the large industrial component.

Although industrial space heat is not shown, it would likely be considerable. The high industrial load generally suggests this is the first area to consider conservation plans. Residential heating is less than other areas, reflecting the climate of southern Newfoundland, and would be more difficult to justify conservation (but it may still be attractive). Residential electricity use is much higher than other areas, possibly reflecting a higher standard of living earned from the industrial base.

Energy alternatives are limited on this offshore island, with the possible exception of wind, which still needs evaluation.

COMMUNITY: INUKJUAK **CATEGORY:** NOUVEAU **POPULATION:** 650

Buildings: **Residential:** 102 houses; 35 considered uninhabitable; 67 - 3 and 4 bedroom houses of uncertain quality

Community: 1 laundry, 1 church, 1 elementary school, post office

Commercial: 6 warehouses and 2 garages, 1 office building

Residential Heating: N/A
Degree Days: 8900

Transportation: Local air service, few roads, supplies barged in annually.

Power Generation: 1250 kW plant uses 767000 L @ $0.48
Demand: 1978395 kWh **Peak Load:** 430 kW
Resources: None noted

Energy Profile:

	Electricity kWh	Electricity GJ	Furnace Oil GJ	Wood GJ	Other GJ	Total Heat GJ
Residential:						
Others:						
	1978395	29146	48412			48412

Derived Data

Building Heating:
Avg Residential Heat = N/A
Cost using oil @ $ /l = $N/A /yr
Cost using wood @ $ /cord = $N/A /yr

Comments: No breakdown on the distribution of heat provided.

Suspected Inconsistencies: 170 electrical subscriptions are shown for 102 residences plus a few commercial buildings.

Transportation: Local use of transportation fuels is likely small, but frequent air service requires a large fuel component.

Power Generation: Demand: 1978395 Actual Use: N/A
Distribution Loss: N/A Efficiency: 2.57 kWh/l

Average Plant Load: 225 kW **Peak Load:** 430
Load Factor .525 **Average Residential Load:** N/A

Conservation and Renewable Energy Alternatives:
Diesel plant is relatively efficient, but load management may be able to allow a more efficient combination of generators to be used.

Community demand per household of 19300 kWh/yr is higher than Ramea, Newfoundland (which has an industrial base), which is unusual considering restrictions on electric space and water heat in effect. Community space heat per household of 474 GJ does not seem excessive based on the degree days and the electric load.

The community appears to have limited resource potential, although the coastal location suggests wind may have potential and there are suggestions for partial solar heating. Efforts should be concentrated on upgraded Conservation Standards. Information on community energy use breakdown and housing quality should be provided.

COMMUNITY: OBEDJIWAN **CATEGORY:** CENTRAL **POPULATION:** 1103

Buildings: **Residential:** 83
Community: Hall, church, school, offices, clinic
Commercial: Stores and motel

Residential Heating: N/A
Degree Days: 6200

Transportation: Road access into village. No public transport.

Power Generation: (By DIAND) Size unknown, uses 420000 L @ $0.30
Demand: 2,000,000 kWh **Peak Load:** 420 kW

Resources: Wood

Energy Profile:

	Electricity		**Furnace Oil**	**Wood**	**Other**	**Total Heat**
	kWh	**GJ**	**GJ**	**GJ**	**GJ**	**GJ**
Residential:						
Others:						
	2,000,000	15,960	11,400	N/A		

Derived Data

Building Heating:
Avg Residential Heat = N/A
Cost using oil @ $ /l = $N/A /yr
Cost using wood @ $ /cord = $N/A /yr

Comments: Profile information is sparse, but there appears to be potential for increased wood use.

Suspected Inconsistencies: Community breakdown needed.

Transportation: Local use of transportaton is probably low, but costs of outside access are high via road or air.

Power Generation: Demand: 2,000,000 Actual Use: N/A
Distribution Loss: N/A Efficiency: 4.76 kWh/l

Average Plant Load: 228 kW **Peak Load:** 450
Load Factor .51 **Average Residential Load:** N/A

Conservation and Renewable Energy Alternatives:
The indicated high efficiency of the diesel plant and the rounded generation figure suggests the power use is understated.

The per household community load of 24000 kWh and the occupancy rate of 13 persons/house suggest that the number of houses is understated.

The per household community fuel use is 137 GJ which suggests that there are a large number of wood heated homes.

The community would likely benefit from conservation measures, increased use of wood heat (including nonresidential applications). This would improve local employment. The wind resource base should also be evaluated.

COMMUNITY: HARRINGTON HARBOUR **CATEGORY:** LOWER NORTH SHORE **POPULATION:** 311

Buildings: **Residential:** N/A
Community: Hospital, Post Office, Small School
Commercial: N/A

Residential Heating: N/A
Degree Days: 6100

Transportation: N/A

Power Generation: Connected to La Tabattiere grid
Demand: 1,654,000 kWh **Peak Load:** N/A

Resources: Some forest resources.

Energy Profile:

	Electricity kWh	Electricity GJ	Furnace Oil GJ	Wood GJ	Other GJ	Total Heat GJ
Residential:	913,000	11,000				
Others:	653,000	7,877				
			N/A	N/A		N/A

Derived Data

Building Heating:
Avg Residential Heat = N/A
Cost using oil @ $ /l = $N/A /yr
Cost using wood @ $ /cord = $N/A /yr

Comments: Insufficient information to say very much. Population has been declining.

Suspected Inconsistencies: Overview has a discrepancy in the total kWh vs. the sum of categories. Above figures are estimates. The heating fuel on the lower north shore is not segregated by community.

Transportation: Likely cars used locally with most energy used in fish boats.

Power Generation: Demand: 1654000 Actual Use: 1654000
Distribution Loss: N/A Efficiency: 3.15 kWh/l

Average Plant Load: 188 **Peak Load:** N/A
Load Factor N/A **Average Residential Load:** 13200 kWh/yr

Conservation and Renewable Energy Alternatives:
Residential load based on 4.5 persons per house is high. Indicates some use of electric space heat.

Insufficient information is provided to establish the community's relative energy use in each sector.

The indicated cost of the small hydro option at $180 M for 20 MW is very high. Grid connection would be less expensive. Either option could supply electric space heat load. In addition, the community could likely benefit from increased insulation and evaluation of forest resources for wood heat.

COMMUNITY: HAVRE AUX MAISONS **CATEGORY:** MAGDALEN ISLANDS **POPULATION:** 2500

Buildings: **Residential:** N/A
Community: One school, air terminal
Commercial: 35

Residential Heating: N/A
Degree Days: 5000

Transportation: Local road, ferry and air service to island

Power Generation: Tied to main generating plant
Demand: 15,660,000 kWh **Peak Load:** 3700
Resources:

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	11,119,000					
Others:	4,541,000					
			2,066,000			2,066,000

Derived Data

Building Heating:
Avg Residential Heat = N/A
Cost using oil @ $ /l = $N/A /yr
Cost using wood @ $ /cord = $N/A /yr

Comments: Fuel based on proration for island total.

Suspected Inconsistencies: Nonresidential electricity prorated from island total.

Transportation: Fish boats likely the major user.

Power Generation: Demand: 15,660,000 Actual Use: 15,660,000
Distribution Loss: N/A Efficiency: 3.42 kWh/l

Average Plant Load: 1787 **Peak Load:** 3700
Load Factor .48 **Average Residential Load:** 20,000 kWh/yr

Conservation and Renewable Energy Alternatives:
Generation is efficient from the Cap Aux Moules central plant, but the high residential load indicates use of electric space heat, which should be avoided.

The island's wind resource should be verified. Other sources of information indicate conflicting information on the reliability of wind turbines, and this must be confirmed prior to proceeding. Other energy resources are insignificant.

The island's building energy conservation program should be monitored for its cost effectiveness. This may be the largest building retrofit program of any remote community, and much valuable information could be gained for other remote communities.

The increased use of electricity for space heat is confirmed by the relatively low fuel oil use of 141 GJ per residence (based on 4.5 persons/house) for all community sectors.

COMMUNITY: ATTAWAPISKAT **CATEGORY:** NATIVE COASTAL **POPULATION:** 2500

Buildings: **Residential:** 157
Community: School, teacherage, hospital, hall, church
Commercial: 2 stores

Residential Heating: All residences use wood
Degree Days: 7010

Transportation: Locally snowmobiles. Air, barge and winter road to outside

Power Generation: 725 kW plant uses 418,000 L @ .43/l
Demand: 877836 kWh **Peak Load:** N/A

Resources: Sufficient forests for local use. Possible wind potential.

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:			0	25,600		25,600
Others:			11,405	0		11,405
	877,836	15,884				2,066,000

Derived Data

Building Heating:
Avg Residential Heat = 163 GJ
Cost using oil @ $0.43/l = $1844 /yr
Cost using wood @ $80/cord = $815 /yr

Comments: Most of the fuel use by the school.

Suspected Inconsistencies: Residential and nonresidential electrical breakdown required.

Transportation: Local transportation use is small, but fuel used for air and barge shipments.

Power Generation: Demand: 877836 Actual Use: 877836
Distribution Loss: N/A Efficiency: 2.09 kWh/l

Average Plant Load: 100 **Peak Load:** N/A
Load Factor N/A **Average Residential Load:** N/A

Conservation and Renewable Energy Alternatives:
The diesel generator is relatively inefficient, and the minimum size unit exceeds the average load. The system should be investigated.

The cost of fuel is $180,000/yr against a cost of maintenance of $233,000/yr and a revenue of $252,314/year, so even an improvement in fuel use would still leave the system losing money. The use of fuel oil by the school would appear to be excessive, based on the degree days and the size of school.

Potential energy in the area would be found in wind, peat, and wood, once study concluded. Conservation and energy management must also be investigated.

COMMUNITY: RAMSEY **CATEGORY:** RAILWAY **POPULATION:** 127

Buildings: **Residential:** 21 homes and 10 bunkhouses
Community: Curling club, church, school
Commercial: Forest camp facilities, Railway maintenance

Residential Heating: 10% wood, 90% oil heat
Degree Days: 5915

Transportation: Heavy use of fuel in forest harvesting.

Power Generation: E B Eddy Plant, 650 kW uses 411800 L @ 25.2¢/l
Demand: N/A **Peak Load:** N/A

Resources:

Energy Profile:

	Electricity kWh	Electricity GJ	Furnace Oil GJ	Wood GJ	Other GJ	Total Heat GJ
Residential:			2622	320		2942
Other:			5954	0		5954
	N/A	15650	8576			

Derived Data

Building Heating:
Avg Residential Heat = 125 GJ
Cost using oil @ $0.28/l = $ 921 /yr
Cost using wood @ $80/cord = $ 625 /yr

Comments: Population varies with forest crews. Bunkhouse use is variable, but accounts for most of nonresidential heat. Residential use of oil is considered low for the climate.

Suspected Inconsistencies: Power production is estimated below based on 3.0 kWh/l.

Transportation:

Power Generation: Demand: Actual Use: 1,235,400
Distribution Loss: N/A Efficiency: 3.0 kWh/l

Average Plant Load: 141 kW **Peak Load:** N/A
Load Factor N/A **Average Residential Load:** N/A

Conservation and Renewable Energy Alternatives:
Diesel efficiency may be low based on the assumed conversion rate, when the 400 kW unit is on-line most of the time.

The increased use of forest resources appears to be the best option, but the town's status of "company" town may make this difficult to implement. Energy management in the bunkhouse could probably result in savings.

COMMUNITY: DEER LAKE **CATEGORY:** NATIVE INTERIOR **POPULATION:** 481

Buildings: **Residential:** 82
Community: Hall, church, health centre, school, teacherage
Commercial: 3 stores

Residential Heating: All wood heated
Degree Days: 6350

Transportation: Little local transport. Air and winter road to outside.

Power Generation: No community facility
Demand: N/A **Peak Load:** N/A

Resources: Wood, small hydro

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	0	0	0	13120		13120
Others:	N/A	3192	5000	0		5000

Derived Data

Building Heating:

Avg Residential Heat = 160 GJ
Cost using oil @ $0.54/l = $ 2273 /yr
Cost using wood @ $80/cord = $ 800 /yr

Comments: Generators for school, communciation, airport.

Suspected Inconsistencies: Use of energy by the school is probably high. Residential use @ 10 cords is consistent throughout Ontario despite different climates.

Transportation:

Power Generation: Demand: N/A Actual Use: 252000 kWh
Distribution Loss: N/A Efficiency: 3.0 kWh/l
Estimated use of 3 generators

Average Plant Load: 28 kW **Peak Load:** N/A
Load Factor N/A **Average Residential Load:** N/A

Conservation and Renewable Energy Alternatives:

The community is rated as having a good small hydro resource, although the sites described are not impressive. With no central generation, the community could do a thorough study of options available if a central generator was to be installed rating small hydro against wood gasification and diesel. Based on an expected diesel cost of .54/l (1981), power generation could cost at least 20¢/kWh and a number of alternatives may be feasible. If a system was put in, community electrification would also occur, and a good opportunity would arise to include an energy management system to ensure that system installed capacity (and hence cost) was minimized.

COMMUNITY: OXFORD HOUSE **CATEGORY:** NATIVE **POPULATION:** 1250

Buildings: **Residential:** 175
Community: School and teacherages, nursing station, air terminal, offices, hall, church
Commercial: 2 stores, agencies

Residential Heating: All heated with wood
Degree Days: 7700

Transportation: Winter road and air access.

Power Generation: 1100 kW plant uses 595,000 L @ 0.32
Demand: 1,680,000 **Peak Load:** 385

Resources: Wood, small hydro 8 km away

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	**GJ**	**GJ**	**GJ**	**GJ**	**GJ**
Residential:	760,000	10430	0	45583		45583
Others:	918,000	12598	15712	1027		16739

Derived Data

Building Heating:
Avg Residential Heat = 260 GJ
Cost using oil @ $0.34/l = $ 2326 /yr
Cost using wood @ $80/cord = $ 1300 /yr

Comments: School is reported to utilize waste heat from generators.

Suspected Inconsistencies: Residential heating is higher than most communities, even considering the high degree days.

Transportation: Local transport a small component.

Power Generation: Demand: 1,680,000 Actual Use: 1,680,000 kWh
Distribution Loss: N/A Efficiency: 2.82 kWh/l

Average Plant Load: 192 kW **Peak Load:** 385
Load Factor .50 **Average Residential Load:** 4342

Conservation and Renewable Energy Alternatives:

The high use of wood, the good forest resource and the high heating load implies that conservation opportunities should be examined. Low use of electricity per house reflects low standard of living.

There is a small hydro source within reasonable distance, but more detailed study is needed to see if it could replace diesel generation economically. Other resources are unlikely to be attractive.

COMMUNITY: CHURCHILL **CATEGORY:** INDUSTRIAL **POPULATION:** 1600

Buildings: **Residential:** 510
Community: Approximately 20
Commercial: N/A

Residential Heating: Electricity, propane and fuel oil
Degree Days: 9200

Transportation: Air, Rail and Shipping

Power Generation: 11248 kW plant uses 7,695,000 L @ .34

Demand: 22,240,000 **Peak Load:** 6150

Resources: No wood, no small hydro. Wind may be possible, but must be competitive with existing bulk fuels and potential of grid connection.

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	8,949,000	119836	4064	0	8514	12578 *
Others:	14,035,000	187943	115597	0	37183	152780

***not including electric heat**

Derived Data

Building Heating:

Avg Residential Heat (GJ) = 203 (oil) 106 (propane) 346 (electric)
Cost using oil @ $0.34/l = $ 1816 /yr
Cost using electricity = $ 3098 /yr

Comments: Electric space heating is very costly. Rate of fuel use is proportional to the degree days, based on other regions.

Suspected Inconsistencies: Propane use for heating seems low.

Transportation:

Power Generation: Demand: 22,240,000 Actual Use: 22,240,000 kWh
Distribution Loss: N/A Efficiency: 2.89 kWh/l

Average Plant Load: 2540 kW **Peak Load:** 6150
Load Factor .41 **Average Residential Load:** 17,547

Conservation and Renewable Energy Alternatives:
Diesel generators are reasonably efficient, but based on records of other large plants, there may be ways to increase efficiency. Approximately $1200/year (from utility perspective) could be saved by converting electric heated homes to oil heat. Further savings possible with improved insulation.

There are negligible energy resources nearby but the large loads justify a large radius of search. The assumed cost for central system supply could be improved if the grid electricity was used to space heat existing nonresidential oil and propane users.

COMMUNITY: DESCHAMBAULT LAKE **CATEGORY:** NATIVE **POPULATION:** 517

Buildings: **Residential:** 82 25% new
Community: School, clinic, office, hall, church
Commercial: Store, fish plant

Residential Heating: Most houses wood heated
Degree Days: 6800

Transportation: Road access to outside

Power Generation: 650 kW plant uses 375000 L @ .29
Demand: 1,072,000 **Peak Load:** 730

Resources: Wood resource good. Small hydro poor. Peat may have potential.

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	385,000	5210	1045	7872	237	9154
Others:	758,000	10257	6967	0	1327	8294

Derived Data

Building Heating:
Avg Residential Heat = 112
Cost using oil @ $0.31/l = $ 913 /yr
Cost using wood @ $80/cord = $ 560 /yr

Comments:

Suspected Inconsistencies: Residential heat use is low. Either houses are generally well insulated and/or houses are small and heated partially or fuel use is under-reported.

Transportation: Vehicles used locally and roads connect to highway system.

Power Generation: Demand: 1,072,000 Actual Use: 1,143,000 kWh
Distribution Loss: (-6%) Efficiency: 2.86 kWh/l

Average Plant Load: 130 kW **Peak Load:** 230
Load Factor .57 **Average Residential Load:** 4695

Conservation and Renewable Energy Alternatives:

If the actual fuel uses are correct the buildings are well insulated. As a large portion of the energy use is in the school, and residential use is moderate, the school should be examined for energy management and conservation opportunities. Although the school is 700 m from the power plant, consideration might be given to moving the plant to allow the school to use waste heat and save about $25000/year in oil use.

COMMUNITY: JEAN D'OR PRAIRIE **CATEGORY:** NATIVE **POPULATION:** 650

Buildings: **Residential:** 70
Community: School and Nursing Station
Commercial: 14 customers

Residential Heating: Mainly wood
Degree Days: 7100

Transportation: Highway Access

Power Generation: 450 kW plant use 293000 L @ .31
Demand: 652000 kWh **Peak Load:** 163

Resources: Wood

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	221000	3800	380	12300	1500	14180
Others:	380000	6530	1260	0	5200	6460

Derived Data

Building Heating:

Avg Residential Heat = 202 GJ
Cost using oil @ $0.31/l = $ 1652 /yr
Cost using wood @ $80/cord = $ 1010 /yr

Comments:

Suspected Inconsistencies: Conflicting valves on total electrical generation. 601-727 MWh, depending on the reference table.

Transportation:

Power Generation: Demand: 652,000 Actual Use: 601 kWh
Distribution Loss: 8% Efficiency: 2.22 kWh/l

Average Plant Load: 69 - 83 kW **Peak Load:** 163
Load Factor .51 **Average Residential Load:** 3157

Conservation and Renewable Energy Alternatives:

Diesel is relatively inefficient and should be checked. Residential electricity use is low, hence conservation efforts should be directed at other sectors. The space heating load is relatively high for the climate and some effort could be made to conserve wood resources.

Potentials for grid or gas connection are worth further study. There is also some waste heat potential which could be utilized.

COMMUNITY: BELLA BELLA **CATEGORY:** UTILITY **POPULATION:** 1414

Buildings: **Residential:** 271
Community: 12 Buildings
Commercial: 7 Buildings

Residential Heating: 70% wood and 30% oil
Degree Days: 3630

Transportation: Limited local travel - served by air and ferry

Power Generation: 3000 kW plant use 2,450,000 L @ .30
Demand: 7,568,000 kWh **Peak Load:** 1850

Resources:

Energy Profile:

	Electricity		**Furnace Oil**	**Wood**	**Other**	**Total Heat**
	kWh	**GJ**	**GJ**	**GJ**	**GJ**	**GJ**
Residential:	3,372,000	41,500	13,572	31,670	0	45,242
Others:	4,121,000	50,600	37,968	0	0	37,968
			51,540			

Derived Data

Building Heating:
Avg Residential Heat = 167 GJ
Cost using oil @ $0.35/l = $ 1538 /yr
Cost using wood @ $ /cord = $ 835 /yr

Comments: The residential heat is high considering the degree days, but the damp climate is partly responsible and the houses are generally large and incomes are moderate.

Suspected Inconsistencies:

Transportation: Most local travel in fish boats

Power Generation: Demand: 7,568,000 Actual Use: 7,568,000 kWh
Distribution Loss: N/A Efficiency: 3.09 kWh/l

Average Plant Load: 864 **Peak Load:** 1850
Load Factor .47 **Average Residential Load:** 11708

Conservation and Renewable Energy Alternatives:
The diesel generating plant is relatively efficient, but there are few load restrictions on the subsidized power rates. The high residential average reflects some space heating and probably water heating, which could be better served by other means.

The community has a moderate industrial and service base relating to the fishing industry.

The relatively high heating load, considering the temperate climate indicates emphasis should be placed on the conservation sector. There are few resources immediately near the town, but subsequent reports have identified the potential of a 45 km grid connection to an existing hydro site at an abandoned mill.

COMMUNITY: GREENWOOD **CATEGORY:** LOGGING **POPULATION:** 44

Buildings: **Residential:** 10 (bunkhouses)
Community: 1
Commercial: 2

Residential Heating: 10% oil 80% electric 10% propane
Degree Days: 3200

Transportation: Logging equipment

Power Generation: Size unknown, 105000 L used
Demand: N/A **Peak Load:** N/A

Resources: Small hydro, wood

Energy Profile:

	Electricity kWh	Electricity GJ	Furnace Oil GJ	Wood GJ	Other GJ	Total Heat GJ
Residential:				0		
Other:						
	315000	4090	2300		460	6850

Derived Data

Building Heating:
Avg Residential Heat =
Cost using oil @ $ /l = $ /yr
Cost using wood @ $ /cord = $ /yr

Comments: Oppportunities involving wood use may not be feasible because of the high local labour rates. Camp is open for about 9 months of the year. Residential heat based on converting bunkhouse use to house equivalent.

Suspected Inconsistencies: Like most camps, there is little knowledge of power generated, only the fuel bill is known. Total heat above does not include the electric heat portion.

Transportation: Expected high use of energy in logging equipment

Power Generation: Demand: 315,000 Actual Use: 315,000
Distribution Loss: N/A Efficiency: 3.0 (est.)

Average Plant Load: 36 **Peak Load:** N/A
Load Factor N/A **Average Residential Load:** 31500 kWh

Conservation and Renewable Energy Alternatives:
The camp is typical of many coastal logging camps in that a better understanding of energy use is needed before any constructive improvements can be made. The use of energy would certainly be higher if the camp stayed open during the winter, when only a caretaking staff remains.

The use of electricity for space heat could be modified, unless a small hydro project is developed, in which case the plant load would be enhanced. However, energy management may need to be used to provide more uniform loads. The average residential electric load stated is high because of electric heating and because the camp bunkhouses have been equated to homes on the basis of 4 rooms = 1 house. Common areas, such as cookhouse, rec hall and offices are additional.

COMMUNITY: TROUT LAKE **CATEGORY:** INDEPENDENT **POPULATION:** 50

Buildings:		
	Residential:	35
	Community:	2
	Commercial:	3

Residential Heating: 10% propane, 90% wood
Degree Days: 4100

Transportation: Located on highway, unrestricted access

Power Generation: No Central Generation
Demand: N/A **Peak Load:** N/A

Resources: Wood and Small Hydro

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	0			4430	492	4922
Other:	0		690		6380	

Derived Data

Building Heating:

Avg Residential Heat	=	140
Cost using oil @ $.34 /l	=	$ 1252 /yr
Cost using wood @ $80/cord	=	$ 703 /yr

Comments: No. of houses vs. population reflects seasonal use. 50% of the homes are reported well insulated, which further reduces the heat load.

Suspected Inconsistencies: Small private generators may be in use.

Transportation: Local travel minimal but residents would all have vehicles and may travel away from the community. Largest fuel user would be highways maintenance.

Power Generation: Demand: N/A Actual Use: 0
Distribution Loss: 0 Efficiency: N/A

Average Plant Load: N/A **Peak Load:** N/A
Load Factor N/A **Average Residential Load:** N/A

Conservation and Renewable Energy Alternatives:
Most of the oil use is by community/commercial buildings and the highways yard. Residents would like electrical service, but a grid connection is too expensive considering the population. Similarly the community is too small and costs prohibitive for a remote utility operated diesel.

Small hydro may show potential, but the means of the community financing and operating such a project would need to be explored, even if an apparently cost effective site was found.

COMMUNITY: DAWSON CITY **CATEGORY:** COMMUNITY **POPULATION:** 900

Buildings:
Residential: 390
Community: 110
Commercial: 90

Residential Heating: 18% wood heat, 82% oil heat
Degree Days: 8408

Transportation: N/A

Power Generation: N C P C 1970 kW plant uses 2,480,000 L @ .50
Demand: 7,451,000 **Peak Load:**

Resources: Hydro, wood (limited) waste heat

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	3,100,000	39000	51900	16708		68608
Other:	3,900,000	49000	78245			78245

Derived Data

Building Heating:

Avg Residential Heat = 176
Cost using oil @ $.50 /l = $ 2300 /yr
Cost using wood @ $80/cord = $ 880 /yr

Comments: Residential heat reflects cold climate, partial home occupancy and mixed oil and wood uses.

Suspected Inconsistencies: The large number of commercial and community buildings may reflect outbuildings which are unheated.

Transportation: N/A

Power Generation:
Demand: 7,451,000
Actual Use: 7,000,000
Distribution Loss: 6%
Efficiency: 3.00

Average Plant Load: 850
Peak Load: N/A
Load Factor N/A
Average Residential Load: 7948

Conservation and Renewable Energy Alternatives:

Diesel generation is reasonably efficient, but could be supplemented with hydro generation once environmental objections are overcome.

Increased use of wood is possible, but the economic use could only be accomplished with enhanced insulation and organised wood harvesting. About half of the homes were built before 1975, which indicates a large potential for conservation.

COMMUNITY: IGLOOLIK **CATEGORY:** BAFFIN **POPULATION:** 766

Buildings: **Residential:** 154
Community: 6
Commercial: 9

Residential Heating: 100% oil
Degree Days: 11500

Transportation: 4257 GJ. Served by air and annual barge with minimal local transportation.

Power Generation: 1200 kW system uses 660 m^3 fuel @ .51
Demand: 1,921,000 kWh **Peak Load:** 398 kW

Resources: Marine mammals, fish and game. No energy resources with possible exception on wind.

Energy Profile:

	Electricity		**Furnace Oil**	**Wood**	**Other**	**Total Heat**
	kWh	**GJ**	**GJ**	**GJ**	**GJ**	**GJ**
Residential:	1,132,000	33527	-	-	-	33527
Other:	785,000	10439	34088			34088

Derived Data

Building Heating:

Avg Residential Heat = 218 GJ
Cost using oil @ 50% eff and $.51/l = $ 2921 /yr
Cost using wood @ 50% eff and $ /cord = $N/A /yr

Comments: Inuit community which has historically been located in the same area. The residential fuel is all used in government housing. Average residential power bill is $137/month. Average household energy bill $4500/yr.

Suspected Inconsistencies:

Transportation: Most of the transportation fuel is used for government vehicles and aviation.

Power Generation: Demand: 1,921,0007 Actual Use: 1,921,000
Distribution Loss: N/A Efficiency: 2.91 kWh/l

Average Plant Load: 219 **Peak Load:** 398
Load Factor .55 **Average Residential Load:** 7350

Conservation and Renewable Energy Alternatives:

The use of fuel for heating is not unreasonable considering the degree days, but the level of electrical use seems high considering the expected standard of living. With the high degree days, the buildings could be checked for upgraded insulation (even though they may be built to recent Northern standards).

The reported wind velocity and location in a high wind energy zone may warrant examination of a wind turbine to supplement diesel generation.

COMMUNITY: RANKIN INLET **CATEGORY:** KEEWATIN **POPULATION:** 956

Buildings:
Residential: 259
Community: 10
Commercial: 25

Residential Heating: 100% oil
Degree Days: 11500

Transportation: 17215 GJ. Served by air and barge from Churchill.

Power Generation: 2720 kW plant uses 1818 m^3 fuel @ .54
Demand: 5,583,000 kWh **Peak Load:** 1158 kW

Resources: Formerly a mine, now fish, game and marine mammals are the only developed resources.

Energy Profile:

	Electricity		Furnace Oil	Wood	Other	Total Heat
	kWh	GJ	GJ	GJ	GJ	GJ
Residential:	2,935,000	37000	48760	-	-	48760
Other:	2,647,000	33400	61647	-	-	61647

Derived Data

Building Heating:
Avg Residential Heat = 188 GJ
Cost using oil @ 50% eff and $.54/l = $ 2626 /yr
Cost using wood @ 50% eff and $ /cord = $N/A /yr

Comments: Relatively recent community (1950's) started as a mining town. After mine closed the town has become an administrative center.

Suspected Inconsistencies:

Transportation: Most of the fuel used by government vehicles and aircraft. Snowmobile service to Eskimo Point in winter.

Power Generation: Demand: 5,583,000 kWh Actual Use: 5,583,000 kWh
Distribution Loss: N/A Efficiency: 3.07 kWh/l

Average Plant Load: 637 **Peak Load:** 1158
Load Factor .55 **Average Residential Load:** 11,332

Conservation and Renewable Energy Alternatives:

High electrical use could probably be due to some understatement of the number of homes in the available data. Also, the town's income is higher with more government jobs.

This town also has good wind potential but no other feasible means of electricity generation. Conservation and energy management should be emphasized.

COMMUNITY: FORT PROVIDENCE **CATEGORY:** MACKENZIE **POPULATION:** 571

Buildings: **Residential:** 121
Community: 6
Commercial: 11

Residential Heating: About 90% use oil.
Degree Days: 8131

Transportation: 12275 GJ. Road Transport.

Power Generation: 1350 kW plant uses 631 m^3 fuel
Demand: 1,564,000 kWh **Peak Load:** 426 kW

Resources: Agriculture, timber, fish and game.

Energy Profile:

	Electricity		**Furnace Oil**	**Wood**	**Other**	**Total Heat**
	kWh	**GJ**	**GJ**	**GJ**	**GJ**	**GJ**
Residential:	827800	13948	18079	1536	-	19615
Other:	736200	12406	62090	-	-	62090

Derived Data

Building Heating:

Avg Residential Heat = 162 GJ
Cost using oil @ 50% eff and $.50/l = $ 2094 /yr
Cost using wood @ 50% eff and $80/cord = $ 810 /yr

Comments: Fuel price is estimated.

Suspected Inconsistencies: Information was not available for the wood gasifier in use at a hotel.

Transportation: Situated near highway, so most fuel is used for motor vehicles.

Power Generation: Demand: 1,564,000 kWh Actual Use: 1,564,000 kWh
Distribution Loss: N/A Efficiency: 2.30 kWh/l

Average Plant Load: 179 **Peak Load:** 426
Load Factor .42 **Average Residential Load:** 6898

Conservation and Renewable Energy Alternatives:
The community is in a treed area, but oil heat predominates. The construction of a wood gasifier for electrical generation and space heat at a hotel would indicate that there is a good local resource of wood, and that it could be expanded for at least the space heating potential. The results of the gasifier operating experience will help to indicate the future potential of the technology for most NWT communities below the tree line.

There is a large use of oil in the government sector for space heat, and options using improved insulation and/or wood heat should be explored.

Diesel generator efficiency is relatively low considering other plants.